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PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*.

A vowel is *long* when standing alone or in a syllable which ends in silent *e* or when ending an accented syllable.

S is always soft, and never has the sound of *s*.

The foreign sounds which have no equivalent in the English language are represented as follows:

K for the German *ch*, as in Bach: (Bach, *baK*).

N for the French *n*, as in Breton: (Breton, *bre toN*).

ö for the German *o*, as in Gottingen: (Gottingen, *go'ting en*).

ti for the German *u*, as in Blücher: (Blücher, *bluK'ur*).

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CHRONOLOGY, *kro nol'o ji*, the science which treats of time, and has for its object the arrangement and exhibition of historical events in order of time, and the ascertaining of the intervals between them. Its basis is necessarily the method of measuring or computing time by regular divisions or periods, according to the revolutions of the earth or moon. The motions of these bodies produce the natural division of time into years, months and days.

As there can be no exact computation of time or placing of events without a fixed point from which to start, dates are fixed from an arbitrary point, or *epoch*, which forms the beginning of an *era*. Thus, the epoch almost universally in use to-day, as the point from which all events are dated, is the birth of Christ. The letters B. C. and A. D. (*Anno Domini*, in the year of our Lord) are used to designate respectively dates before and after the birth of Christ. Among the Greeks time was reckoned by Olympiads, the four-year intervals between successive games, and the beginning of their era was approximately 776 B. C. The Romans calculated from the time of the founding of Rome, 753 B. C., and the Mohammedans from the flight of Mohammed (see *HIGRA*).

CHRONUS, also spelled Cronus, in mythology was the father of Demeter, Hades, Hestia, Hera, and Poseidon, whom he swallowed at birth. Rhea was his wife. When Zeus was born, Rhea's scheme saved him.

CHRONOMETER, *kro nom'e ter*, an instrument for measuring time, the name not applied, however, to the ordinary watch or clock. It is a portable timepiece, intended to mark time with great accuracy, and made to beat at half-second intervals. Chronometers are used in astronomical observations and in determining longitudes at sea.

CHRYSALIS, *kris'a lis*, an intermediate form which butterflies assume after they cease to be larvae and before they reach their winged, or perfect, state. While in the chrysalid state, the animal is resting in apparent insensibility, entirely without food, though it continues to breathe. The chrysalis in most cases is protected from observation by its color, which closely resembles the object to which it is attached. In the case of moths the larva weaves around itself a cocoon, in which the change to the pupa stage takes place. See *BUTTERFLY*.

CHRYSANTHEMUM, *kris an'the mum*, a

group of plants resembling the asters, comprising herbs and shrubs, and bearing large heads of flowers on the ends of the stems or branches. Two species are common weeds in Great Britain: the *ox-eye daisy*, a meadow plant with white ray flowers, and the *corn marigold*, a weed with golden-yellow ray flowers. The former is now very common in the United States and Canada. The gorgeous chrysanthemums of the gardens are varieties of Chinese and Japanese plants. These are extensively cultivated in the hot-houses of most countries and are remarkable for the great variety of form and the brilliancy of color which they show during the period of their autumn blooming. The chrysanthemum is the national flower of Japan, and the open variety with sixteen ray flowers is the imperial emblem.

CHRYSOBERYL, *kris'o ber' il*, a variety of beryl that occurs in six-sided crystals which are sometimes compressed. It contains considerable alumina, has a glassy luster and is of various shades of green. Occasional specimens appear red when held between the eye and the light. One variety forms the gem called *cat's-eye*, and other varieties suitable for gems are occasionally found, but most specimens are of inferior quality. Chrysoberyl was known to the ancients as oriental topaz and oriental chrysolite. It is found in Ceylon, the Ural Mountains and Brazil, and in the United States at Haddam, Conn., and at various localities in Maine.

CHRYSOLEITE, *kris'o lite*, a mineral composed of silica, magnesium and iron. Its prevailing color is some shade of green. It is harder than glass, but is less hard than quartz, it is often transparent, sometimes only translucent. Very fine specimens are found in Egypt and Brazil, and it occurs in large quantities in North Carolina. Gem varieties are known as *olivine* and *peridot*.

CHRYSOPRASE, *kris'o praze*, a stone found in small quantities in Germany and some parts of America, formerly much prized as a gem. It is apple-green in color, but under the influence of heat it loses its brilliancy and is therefore not much used. It is mentioned in the Bible, and was probably known to the ancients.

CHRYSOBOSTOM, *JOHN* (about 345-407), a Syrian and one of the early Christian fathers. His zeal led him to assail worldliness so strenuously in Constantinople that banishment followed, on the way to which he died.

CHUB, a river fish of the carp family, also known as *dace*. The body is oblong, nearly round, and the head is broad. The head and back are green, the sides are silvery and the belly is white. This fish frequents deep holes in rivers shaded by trees, but in warm weather floats near the surface and furnishes sport for anglers. It is of little account as food and rarely attains the weight of five pounds. See **DACE**.

CHURCH, a word which in its widest sense denotes the whole community of Christians and was thus used by the New Testament writers. In a more restricted meaning, it denotes a particular section of the Christian community, differing in doctrinal matters from the remainder, as the Roman Catholic Church, the Protestant Church, or the leading church of a nation, as the English, Scotch or French Church. In yet another sense, it signifies an edifice appropriated to Christian worship. After the conversion of Constantine, the basilicas or public halls and courts of judicature and some of the heathen temples were consecrated as Christian churches. When churches came to be specially built for Christian worship, the forms were various, but later the form with the cross aisle or transept became common. Churches are classed as *cathedral*, when containing a bishop's throne; *collegiate*, when served by a dean and chapter; *conventual* or *minster*, when connected with a convent or monastery; *abbey* or *priory*, when under an abbot or prior, and *parochial*, when the charge of a secular priest.

CHURCH, FREDERICK EDWIN (1826-1900), an American artist born in Hartford, Conn. He went to New York and in 1849 was elected a member of the National Academy. In 1853-1857 he traveled in South America. Later he went on an expedition to the coast of Labrador and on his return painted his great picture, *Icebergs*. Church traveled through the West Indies, Europe and Palestine in 1866. His best work was the *Great Fall at Niagara*; other works are *Damascus*, *Jerusalem* and *The Parthenon*. His pictures are mostly pictorial, and they abound in details, to a fault, but they show care and skill.

CHURCHILL, WINSTON (1871-), an American novelist whose books, dealing with purely American subjects, are often counted among the "best sellers." He was born in Saint Louis and educated at the United States

Naval Academy at Annapolis. Churchill was for a time editor of the *Army and Navy Journal*, and in 1895 he became managing editor of the *Cosmopolitan Magazine*. After contributing short stories to leading magazines, he gained wide popularity through his trilogy of historical novels, *Richard Carvel*, *The Crisis* and *The Crossing*. In *Mr. Crewe's Career* and in *Coniston* he portrayed contemporary political life in New England, and in *The Inside of the Cup* he dealt with the relation of religion to social problems. Later works were *The Traveller in War-Time* and *Dwelling Place of Light*.

CHURCHILL, WINSTON LEONARD SPENCER (1874-), an English statesman, soldier and author, son of the late Lord Randolph Churchill. He entered the army in 1895 and served in India, and then in Egypt. He took part in the Battle of Khartum where he won a medal for gallant conduct. After serving during the Boer War as correspondent for the *London Morning Post*, he was elected to the House of Commons in 1900 as a Conservative. Having become a member of the Liberal party, he was appointed Under Secretary of State for the Colonies, holding that office from 1905 to 1907. From 1908 to 1910 he was President of the Board of Trade; from 1910 to 1912, Home Secretary; in 1912 he was appointed First Lord of the Admiralty in the Asquith Ministry, being one of the youngest men who ever held that post. In 1913 Churchill made his sensational proposal to Germany in regard to a "naval holiday." His plan was to have England and Germany cease from adding to their respective navies for one year, but before any action was decided upon all such plans were overturned by the outbreak of the World war.

Churchill threw himself wholeheartedly into the struggle, but his conduct of naval affairs was much criticized, and in 1915 he was relieved of his office. For a brief period he held the unimportant position of Chancellor of the Duchy of Lancaster, but England later recognized its need of a man of his ability, and in 1917, when the Lloyd George Cabinet was reorganized, Churchill



was appointed Minister of Munitions Churchill was reelected to Parliament in the general election of December, 1918, and when the new Cabinet was organized in January, 1919, he was made Secretary of the War Department, with which was combined the Air Ministry. In 1926, he became Chancellor of the Exchequer in the Conservative Government.

He has written *The River War*, London to Ladysmith via Pretoria, *My African Journey* and a biography of his father.

CHURCHILL, MAX, a port on Hudson Bay, the terminus of the Hudson Bay branch of the Canadian National Railway. The Government has constructed docks and a large elevator. Shipments of wheat from the Western Provinces direct to Europe via Hudson Bay began in 1931. Churchill River, which empties into Hudson Bay at this point, is the most important river in Manitoba. It rises in western Alberta and passes through various lakes or lakelike expansions—the largest being Southern Indian Lake—on its course of more than 1,000 miles.

CHURCH OF ENGLAND. See ENGLAND, CHURCH OF.

CHURN, a vessel used for making butter. An early and simple pattern was shaped like the lower part of a cone. A plunger operated through a hole in the cover stirred the cream within until the butter was separated from the buttermilk. Churns of a later pattern are now in general use and these secure the desired result by rotary motion. In creameries large churns operated by power are in use. See BUTTER; CREAMERY.

CHURUBUSCO, *choo roo boos'ko*, BATTLE OF, a battle of the Mexican War (which see), fought near the city of Mexico, August 20, 1847, between 18,000 Americans under General Taylor and 25,000 Mexicans under Santa Anna. The fighting was severe throughout one day, the Americans being at one time threatened with defeat, but a determined counter-attack won an advantageous position, from which the Americans compelled the surrender of the fortress. The Mexicans retreated to the City of Mexico.

CHYLE, *kile*, an opaque, milky fluid, found in the small intestine during digestion. It is formed by the action of the intestinal juices, bile and pancreatic juice, on chyme. These juices, being alkaline in character, neutralize the acidity of the gastric juice.

Chyle contains the nutritive portion of the food, which is absorbed by the villi of the intestines and carried by the lacteals of the thoracic duct.

Related Articles. Consult the following titles for additional information.

Chyle	Lacteals	Thoracic Duct
Digestion	Lymph	Stomach

CHYME, *kime*, a thick grayish-white substance formed by the action of gastric juice on food in the stomach. The walls of the stomach contract in such a way as to churn the masticated food and mix it thoroughly with the gastric juice, and the resulting chyme passes into the small intestine to be changed into a fluid called chyle (which see).

CICADA, *si kay'da*, more commonly called LOOUST and HARVEST FLY, a large insect, in size varying in spread of wings from one inch to four inches. Doubtless the cicadas (Latin, *cicadidae*) are the noisiest insects in the world, but only the males can be charged with disturbing the peace; the females are silent. The males have a long, shrill note, produced by vibrating membranes of special sound organs located on the under side of the abdomen.

The females lay their eggs in the twigs of trees or shrubs, from which the young drop to the ground soon after they are hatched. The long life they live underground is not well understood, but finally the pupa crawls out upon the trunk of a tree or a spear of grass, its skin splits open along the back, and the full-grown insect emerges. At first the



CICADA

wings are merely watery sacs, but in a very short time they expand to their full size. The most remarkable of the cicadas, and according to the United States Department of Agriculture "the most interesting insect in the world," is the so-called *seventeen-year locust*, whose larvae spend either thirteen or seventeen years under ground, lacking a few weeks, in slow development. Then millions of individuals attain maturity almost at the same moment and emerge for a noisy and strenuous existence above ground, terminating in exhaustion and death after about five weeks. During that period the females lay their eggs by chiseling grooves in the small branches of trees. The larvae reach the

ground and in the soil disappear for their long sleep.

During their short life above ground, during the months of May and June, they have been known to do incalculable damage to crops, often destroying with remarkable completeness within a few hours all growing grain over a wide area. While pursuing their existence long years underground, where they frequently burrow to a depth of several feet, they subsist on the juice of tender tree-roots and on nourishment extracted from the soil.

CICELY, *sis'el-y*, a popular name applied to several plants of the parsley family. Sweet cicely, or sweet chervil, is a plant common in Great Britain and other parts of Europe. It was formerly used in medicine, and in some parts of Europe, particularly Germany, it is used in soups. A species of sweet cicely is found in American woods from Canada to Virginia.

CICERO, *sis'e-ro* (106-43 B. C.), the greatest orator among the Romans, who lived in the stirring period of the declining republic. At one time hailed as the "savior of Rome," his eloquence later caused his banishment and finally his death by beheading.

His father was a friend of some of the leading public men, and Cicero was assisted to the best education available. At the age of twenty-five he came forward as a pleader, and he soon won a most favorable reputation. In 79 B. C. he visited Greece and profited by the instruction of the masters of oratory. He also made a tour in Asia Minor and remained some time at Rhodes, where he visited the most distinguished orators and took part in their exercises.

On his return to Rome his eloquence proved the value of his Greek instruction, and he became one of the most distinguished orators in the forum. In 76 he was appointed quaestor of Sicily, and he behaved with such justice that the Sicilians gratefully remembered him and requested that he conduct their suit against their governor, Verres. He appeared against this powerful robber, and although only two of the seven Verrine orations were delivered, Verres went into voluntary exile. After this suit Cicero rose rapidly in public life, becoming consul in the year 63. It was then that he succeeded in defeating the conspiracy of Cataline, after whose fall he received greater honors than had ever before been bestowed upon a Roman

citizen. He was hailed as the father of his country, and thanksgivings in his name were voted to the gods.

But Cicero's fortune had reached the culminating point. The conspirators who had been executed had not been sentenced according to law, and Cicero, as chief magistrate, was responsible for the irregularity. Publius Clodius, the tribune of the people, raised such a storm against him that he was obliged to go into exile. On the fall of the Clodian faction he was recalled to Rome, but he never succeeded in regaining the influence he had once possessed.

In 52 B. C. he became proconsul of Cilicia, a province which he administered with eminent success. As soon as his term of office had expired he returned to Rome, which was threatened with serious disturbances, owing to the rupture between Caesar and Pompey. He espoused the cause of Pompey, but after the Battle of Pharsalia he made his peace with Caesar, with whom he continued to all appearance friendly and by whom he was kindly treated.

After the assassination of Caesar he hoped to regain his political influence. He allied himself with Octavianus and composed those admirable orations against Antony which are known as *Philippics* (after the speeches of Demosthenes against Philip of Macedon). Octavianus professed to entertain the most friendly feeling toward him, but when he had possessed himself of the consulate and formed an alliance with Antony and Lepidus, Cicero was proscribed. In endeavoring to escape from Tusculum, where he was living when the news of the proscription arrived, he was overtaken and beheaded by a party of soldiers.

Cicero's eloquence has always remained a model. After the revival of learning he was the most admired of the ancient writers, and the purity and elegance of his style will always place his works in the first rank of Roman classics. Students of Latin in high schools read Cicero in the third year of the Latin course. See *ROME*, subhead *History*.

CID, *sid*, *THE*, a name applied to Ruy or Rodrigo Diaz, count of Bivar (1026?-1099), the national hero of Spain. He distinguished himself by his exploits in the reigns of Ferdinand, Sancho and Alfonso VI of Leon and Castile. His life appears to have been entirely spent in fierce warfare with the Moors, then masters of a great part of

Spain His sword, banner and drinking cup are supposed still to be in existence and are greatly revered by the Spanish people. Numerous romances in which history was mingled with the wildest fables were written about him during the sixteenth and seventeenth centuries, and he is the hero of a famous tragedy (*Le Cid*) by Corneille.

CIDER, *sî'dur*, a liquor made from the juice of apples. The apples are ground and crushed until they are reduced to a pulp, the juice is allowed to run into casks, where it is freely exposed to the air until partial fermentation takes place, when a clear liquor of a pale brown or amber color is the result. Unfermented cider is extensively used as a beverage, and it is also boiled to the consistency of sirup and used in cooking.

CIENFUEGOS, *the ain fua'gosc*, the second city of Cuba is size, a seaport on the southern coast, 130 miles southeast of Havana, with which it is connected by railway. It has a safe and capacious harbor on the Bay of Jagua. It is among the finest towns of Cuba and exports sugar, wax and timber products. Population, 1933, 87,970.

CIGAR, a cylindrical roll of dried tobacco leaves, from four to six inches in length, tightly packed, tipped at one end, and used for smoking. The outer leaf, larger than the others, is called the wrapper. The most popular tobacco filler for cigars is called Havana, because grown in Cuba and shipped from the port of Havana. The wrapper may be of Havana tobacco or may be of domestic quality (grown in the United States) or imported from Porto Rico or Sumatra; also both wrapper and filler may be of Havana, or of domestic or foreign growth.

The output of cigars is more stationary than that of cigarettes, averaging during a fifteen-year period in the United States between 3,000,000,000 and 7,000,000,000 per year, according to internal revenue reports (there is a tax on all tobacco products). Cigarettes are displacing cigars in popularity, as is indicated by the constantly increasing consumption of the former (see **CIGARETTE**). The largest number of cigars on which the tax was paid in any one year was 7,822,530,618 (1921); the smallest number since then was 4,763,883,947 (1935).

The most important cigar-manufacturing center in the United States is Tampa, Fla.; New York City is second.

Cigars were first made in the Spanish

West Indies; for this reason the Spanish language leads yet in popularity for names of cigars.

CIGARETTE, a small cylindrical roll of tobacco, encased in rice paper wrapper, used for smoking. The common size is two and three-quarter inches in length, more expensive qualities and lengths reach four and five inches. Probably no other commodity of questionable value has ever gained the success that has attended the cigarette. For many years its manufacturers contended with the well-organized opposition of sincere reformers, but these of late have desisted from their efforts in large measure, for they recognize that they face an almost hopeless task in establishing in the public mind a prejudice against the cigarette. The society that promoted the agitation was incorporated as the Anti-Cigarette League of America, and it was active for more than thirty years, its present-day successor is the Boys' and Girls' Anti-Cigarette League, world-wide, but with declining influence.

Opposition to the cigarette appeared to be accomplishing results until the years of the World War, when soldiers of all countries in camps and trenches found them available in great quantities and declared that nothing else they could purchase soothed shattered nervous forces so completely. Be that as it may, millions of young men returned home after the war with the cigarette habit firmly fixed. Figures attest the truth of the above statement. In the year 1921 manufacturers paid taxes on an output of 45,065,323,000 cigarettes in the United States, the largest number ever made up to that time in any year. The year of greatest production since then was 1934, when 212,781,000,000 were made. The depression years forced consumption down from former high peaks, but in no year there were fewer than 114,000,000,000 sold.

To protect children from the injurious effects of cigarette-smoking, about a dozen states of the American Union prohibit sale to minors.

CILIA, *sî'ea*, small, generally microscopic, hairlike projections found on the inner surface of some organs of the body. They are found in the nasal passages, except where the olfactory nerve is distributed, on the upper surface of the soft palate, in the Eustachian tube and the tympanum, in the larynx, except over the vocal cords, and in every tiny

division of the bronchi. These cilia have a constant rapid motion, which produces a continuous current always in the same direction on the same surface. See BRONCHI, LUNGS.

CIMBRI, *sim'brē*, a warlike tribe of ancient Europe, who, with the Teutons, began the great Germanic migration southward into Roman territory. The movement began in the year 113 B. C. After several years of wandering, and meeting and defeating a Roman army, they entered Gaul, where they were joined by the Teutons. Together they moved toward Italy. But the Roman legions, under their great general Marius, in two decisive battles, at Aix (102 B. C.) and at Verceil (101 B. C.), utterly defeated them.

CIMMERIANS, *sim me'ri ans*, a semi-mythical tribe that once lived in a region "not visited by the sun." From this statement the phrase "Cimmerian gloom" originated. This tribe is mentioned by Homer in the *Odyssey*. Herodotus says that they inhabited the Crimea in southern Russia and were driven out by the Scythians. They came finally into a district west of the Halys River in Asia Minor, where they ravage the country, in the seventh century, B. C.

CINCHONA, *sin ko'na*, an important genus of plants belonging to the madder



CINCHONA

family. They are trees, shrubs or herbaceous plants, with simple, opposite leaves. The fruit is dry. The plants are found almost exclusively in the tropics, and many of the

species are of great medicinal importance; from one of them quinine is produced. The bark is taken off in strips, longitudinally; it is in time renewed by natural growth. Cinchona plants have been taken from Peru, their native home, and they are now cultivated in large plantations in Ceylon, India, Java and other tropical countries. See QUININE, PERUVIAN BARK



Tyler-Davidson Monument

CINCINNATI, *sin sin nai'*, OHIO, the county seat of Hamilton County and the largest city on the Ohio River below Pittsburgh. The city is 263 miles southwest of Cleveland, and 270 miles southeast of Chicago. New York City is 764 miles northeast. Until a few years after 1890 it was the largest city in the state. Its suburbs have grown rapidly, and within an hour's ride from the center of the city there live more than a million people. The 1920 census gave Cincinnati 401,247 people, and that of 1930 increased the number to 451,160, a gain of over twelve per cent in ten years.

Cincinnati lies along the north bank of the Ohio River, opposite the mouth of Licking River; the low land near the water gradually slopes upward for a short distance; there is then a large area of level ground, upon which the business section is built, back of this to the north rise hills of beauty, where the people have built thousands of fine homes. Low water mark at the river is 432 feet above sea level; the hills rise from 420 feet to 525 feet above this low water level.

Commerce and Transportation. Cincinnati has eight railroads of importance. Into the Union Terminal near the river converges the passenger traffic of the Cleveland, Cincinnati, Chicago & Saint Louis, the Chesapeake & Ohio, the Cincinnati Southern, the Baltimore & Ohio and the Louisville & Nashville. The principal lines having separate stations are the Pennsylvania Lines, the Baltimore & Ohio and the Cincinnati, Lebanon and Northern. The Cincinnati Southern, 338 miles in length and operated under lease into the South by the Southern Railway, is owned by the city.

The Ohio River is a great avenue of commerce; boats ply between Cincinnati and all important river ports from Pittsburgh to New Orleans. Electric railways connect the city with all the neighboring suburban districts, and also with the cities and villages on the Kentucky side of the river. Here converge the Atlantic-Pacific Highway and the Dixie Highway, and others of less importance. The municipal and five other airports render complete air service.

There are more than 2,200 industrial establishments in the city and suburbs, which produce manufactures to the value of nearly \$7,000,000 every week. Almost every article known to trade is made, and Cincinnati also has industries found in few other cities. In this latter class is the famous Rookwood pottery works in the northwestern part of the town. The best-advertised soap made in America is a Cincinnati product, the leading playing-card factory in the world is here, as is the main factory of the greatest sectional bookcase company.

Streets and Buildings. Cincinnati boasts the tallest building between New York City and Seattle, in the forty-five story Carew Tower, visible for miles in all directions. The Federal building, erected at a cost of \$5,000,000, is the location of the custom house, Federal courts and United States officials for the local district. The Union Terminal, costing \$11,000,000, is a unique and beautiful structure. Other buildings of note are the Hamilton County Court House, post office, the city hall, tuberculosis and contagious disease hospitals, and the House of Refuge for wayward boys and girls.

Many fine hotels have been built in recent years, and the city is well supplied with clubs. Of churches, the most pretentious is probably Saint Peter's Roman Catholic Cathedral, with a spire 224 feet high. Saint Paul's Methodist Church, two Presbyterian churches, and the Jewish Synagogue are notable buildings.

The intersection of Fifth and Vine streets may be considered as being in the heart of the retail business section. The city hall is six blocks north and west, the post office is one block east. The finest public work of art in the city is the Tyler-Davidson Fountain, in Fountain Square. This is of bronze and was cast in the royal foundry of Munich at a cost of \$200,000. The city also has an equestrian statue of President William Henry Harrison and statues of Garfield and

Lincoln, and in Spring Grove Cemetery is a magnificent bronze statue erected in memory of the soldiers who fell in the Civil War.

Bridges. There is a large suspension bridge between the city and Covington, on the Kentucky side of the river, built in 1867 at a cost of \$1,800,000 and reconstructed in part just before 1900 at a cost of \$500,000. It is 2,763 feet long, is 106 feet above low-water mark, and has a central span of 1,057 feet. Two iron bridges connect the city with Newport, Ky, which lies along the river east of Covington, one is called Central bridge, and across the other runs the Louisville & Nashville Railroad. The Chesapeake & Ohio and the Cincinnati Southern cross into Kentucky on bridges farther west.

The Park System. Much attention has been given to the adornment of the city by developing the existing park system. In 1907 a comprehensive plan for parks was adopted, new areas were purchased and parked, and now Cincinnati has over 3,400 acres in public parks. The largest is Mount Airy Forest, 1,100 acres; Ault Park has 205 acres; Burnet Woods, 170 acres, Victory Parkway, 84, Mount Storm, 67; Mount Echo, 51, and Parker's Woods, 35 acres, Alms Park, 65 acres; Eden Park, 210 acres.

Education and the Arts. Cincinnati is one of the few cities of the world that offers education under municipal control from the kindergarten through the university. The University of Cincinnati (see CINCINNATI, UNIVERSITY OF) is owned by the city, its buildings are in Burnet Woods. One of the foremost Jewish institutions in the United States is Hebrew Union College, the Roman Catholics have two important schools in Saint Joseph's and Saint Xavier's colleges. The Mechanic's Institute is a strong technical institution. The women of the city founded the Art Museum and Art School, which has several large buildings. In music, Cincinnati stands preeminent. Its Symphony Orchestra has an international reputation. The Conservatory of Music and the College of Music have a high standing. Entertainment by radio is afforded by five broadcasting stations in the Cincinnati metropolitan area, the WLW 500,000-watt station being the most powerful in the country. The Cincinnati Zoological Gardens, with barless cages, is one of the oldest and finest. The Museum of Natural History has a remarkable collection of relics of the Mound Builders (which see).

Historical. The site of the city of Cincinnati was first visited by George Rogers Clark in 1780, the first settlement was made in 1788, and the following year Fort Washington was built. In 1790 Hamilton County was organized, and Cincinnati became the county seat. At this time it was given its present name by General Saint Clair, in honor of the Society of the Cincinnati (See CINCINNATI, SOCIETY OF THE). In 1802 it was incorporated as a town, and in 1819 it was organized into a city. The city continued to increase in importance and population. The city has suffered from frequent floods, which have caused much damage in the portion of the town next the river. The last flood was in 1913. In 1911 the movable Fernbank Dam, the largest in the world at the time, was completed; it is adding much to the commercial importance of the city.

The city is governed on the city-manager plan, the city manager being selected by the city council.

CINCINNATI, SOCIETY OF THE, a patriotic society organized by George Washington and his officers in the Continental army, while at Fishkill, on the Hudson River, May 13, 1783. Membership in the society was accorded to all Continental officers who had served three years or who had been honorably discharged, and also to the eldest male descendants of such officers. The society had thirteen branches, one in each of the original thirteen commonwealths, and its first meeting was held at Philadelphia in May, 1784. Washington was the first president of the society; Alexander Hamilton, the second. Owing to serious opposition to the purposes and methods of the organization, which were believed by many persons to be subversive of the principles of democracy upon which the new republic was organized, the Society of the Cincinnati soon declined in influence, and for many years after about 1830 it was practically dormant. In 1893, however, a revival began. Its hereditary living members number about 1,000.

CINCINNATI, UNIVERSITY OF, an institution of higher learning at Cincinnati, Ohio, founded on bequests made by Charles McMicken in 1858, and by grants made subsequently by the city. It is strictly a municipal university, and is under the exclusive control of the city of Cincinnati. The university was open for instruction in 1873. At present it comprises the following depart-

ments: the colleges of liberal arts, engineering, law and medicine, a teachers' college, a graduate department and a technical school. The Clinical and Pathological School of the Cincinnati Hospital and the Ohio College of Dental Surgery are affiliated with the university. The faculty numbers more than 600, and the student enrollment normally is nearly 10,000. There is a library of over 100,000 volumes. Close connection is maintained between the city departments and the university, especially in the fields of engineering, chemistry and civics.

CINCINNATUS, *sin en a'tus*, LUCIUS QUINTUS, a wealthy patrician of the early days of the Roman Republic. He violently opposed, during his consulship, the passage of the law for the equalization at law of patricians and plebeians. When, in 458 B. C., Minucius, the consul, was surrounded by the Aequins, the messengers of the Senate found Cincinnatus at work on his farm when they came to summon him to the dictatorship. He rescued the army from its peril, marched to Rome laden with spoil and then returned quietly to his farm. At the age of eighty he was again appointed dictator, to oppose the ambitious designs of Spurius Maelius.

"Cincinnatus of the West." George Washington was honored with this title, it having first been applied to him by Lord Byron.

CINDERELLA, *sin der el'a*, the title of one of the oldest and best-loved fairy tales. Cinderella, the heroine, who was ill treated by an unkind stepmother and two envious stepsisters, earned her name because she had to sit among the cinders in the chimney corner. When the prince of the kingdom gave a wonderful ball, good fortune came to her, for her fairy godmother, in the guise of a witch, changed her ragged dress into a beautiful gown, and out of a pumpkin and rats she created a splendid coach, with horses and coachman. With this beautiful equipment she attended the ball.

In the ballroom Cinderella lost her glass slipper, which the prince secured. At last he identified her with it, and they were happily married. Plays and operas have been based on this old tale, which has never lost its charm for young or old. A version of the story was known to the ancient Egyptians and to the Greeks. The English versions were adapted from the story as written by Charles Perrault, a French writer.

CINERARIA, *sin e ra' re ah*, a genus of plants consisting of herbs or small shrubs, with small-sized heads of flowers. They were first found in South Africa. The name is derived from the lower leaves, which are of ashy appearance. A number of species are cultivated for garden purposes, and from these an almost endless variety of blossoms of many different colors have been evolved. They are a favorite hothouse plant. Purple, red, and purple and white are the prevailing colors of these popular aster-like flowers.

CINNA, *se' na*, **LUICIUS CORNELIUS**, an eminent Roman, a follower of Marius. Obtaining the consulship in 87 B. C., after the expulsion of Marius from Rome, he impeached Sulla and endeavored to secure the recall of Marius. Driven from the city, he joined Marius and soon gained possession of Rome. The friends of Sulla were massacred, and Cinna and Marius made themselves consuls, 86 B. C. After the death of Marius the army refused to follow Cinna against Sulla and put him to death in 84 B. C. See **MARIUS**.

CINNABAR, *sin' na bahr*, red sulphide of mercury, the principal ore from which mercury is obtained, occurring abundantly in Spain, California, China, Austria, Russia, Peru and South Africa. It is of a cochineal-red color, and it is used as a paint under the name *vermilion*. See **MERCURY**.

CINNAMON, *sin' a mon*, a pleasing condiment, popular with cooks for certain pastries and confections.



CINNAMON

In its native state it is the bark

of the under branches of a species of laurel, which is chiefly found in Ceylon, but grows also in other parts of the East Indies. The tree attains the height of twenty or thirty feet, has oval leaves, pale yellow flowers and acorn-shaped fruit. The Ceylonese bark their trees in April and November. The bark curls up into rolls or quills in the process of drying and the smaller quills are introduced into the larger ones for shipment. These are later assorted according to quality by tasters and are made into bundles. An oil of cinnamon is prepared in Ceylon, but the oil of cassia is generally substituted for it, indeed, the cassia bark is often substituted for cinnamon, to which it has some resemblance, although in its qualities it is much weaker. The leaves, the fruit and the root of the cinnamon plant all yield oil of cinnamon, a drug of considerable value.

CIRCASSIA, *sur kash' e a*, a region of European Russia, extending along the eastern shore of the Black Sea. It became Russian in 1829. The principal source of wealth in the district is petroleum.

Circassians, the name of the people who inhabit Circassia. Both the men and women are noted for their physical perfection, and although they are somewhat dark the women for scores of years, until recently, have been sold into Turkish harems. The religion of the higher class is Mohammedan, but the lower classes are drifting away from the strict letter of the faith, and their belief is half Christian. They number about 150,000.

CIRCE, *sur' se*, a fabled sorceress of Greek mythology, who lived in the island of Aea, represented by Homer as having converted the companions of Ulysses into swine, after having caused them to partake of an enchanted beverage. Milton, in *Comus*, refers to the fable thus:

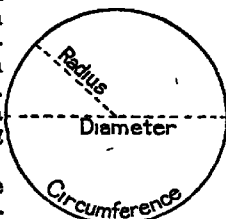
Who knows not Circe,

The daughter of the Sun, whose charmed cup
Whoever tasted, lost his upright shape,
And downward fell into a groveling swine?

Ulysses, under the guidance of Mercury, resisted her enchantments and compelled her to restore his companions.

CIRCLE, *sur' k'l*, a plane figure contained by one line, called the *circumference*, which is so drawn that all its points are equally distant from a certain point within, called the *center*. The *diameter* of the circle is a line drawn through the center and terminat-

ing at the circumference. The *radius* is one-half the diameter. A *great circle* is one on a sphere, whose center coincides with that of the sphere. All other circles on a sphere are *small circles*.



People who have studied higher mathematics have proved that the diameter of a circle multiplied by 3.14159+ will give the circumference. Boys and girls can prove this is a simple way. Measure the distance around a drinking cup, a pan and a pail, then measure the diameter at the same points. Divide the circumference by the diameter and the quotient will be found in each case to be about $3\frac{1}{4}$, or 3.14159+. There is always this same relation between diameter and circumference.

The area of a circle cannot be demonstrated in the same way by boys and girls, but when they have studied geometry they will learn that the area equals the radius (half of the diameter) multiplied by itself and this product multiplied by 3.14159+. In other words, the area equals the square of the radius times 3.14159+. See **MENSURATION**, subhead *Circle*.

CIRCULATION, the flowing of the blood through the arteries, veins and capillaries, whereby the body tissues are provided with nourishment. Arterial blood leaves the left ventricle of the heart, flowing through the aorta and its branches, which carry it to all parts of the body except the lungs. It passes through the capillaries, giving up oxygen and taking carbonic acid, then through the veins, returning to the heart through two large veins that pour their contents into the right auricle of the heart. This auricle contracts, forcing the blood into the right ventricle, which in turn forces it into arteries, that carry it to the lungs, where it gives up carbonic acid and receives oxygen.

Four pulmonary veins carry the blood from the lungs to the left auricle, which forces it into the left ventricle, whence we commenced to trace it. The circulation from the right side of the heart through the lungs to the left side of the heart is called the *pulmonary circulation*, and that from the left side of the heart through the body to the right side, the *systemic circulation*. A

portion of the blood in the intestines is carried through the portal vein to the liver, where, after passing through a fine network of capillaries, it is carried through the hepatic veins to one of the large veins of the systemic circulation. This is called the *portal circulation*. A drop of blood makes the round from the left ventricle and back to it in about thirty seconds.

Although Galen, who had observed the opposite directions of the blood in the arteries and veins, may be said to have been upon the very point of discovering the circulation, William Harvey in 1628 pointed out the connections between the heart, arteries and veins, the reverse directions taken by the blood in the different vessels, the arrangements of valves in the heart and veins so that the blood could flow only in one direction, and the necessity of the return of a large proportion of blood to the heart to maintain the supply. In 1861 Malpighi with a microscope examined the circulation in the web of a frog's foot and showed that the blood passed from arteries to veins by capillaries.

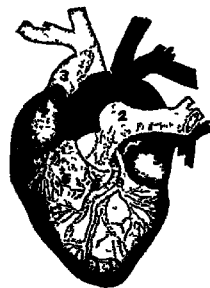
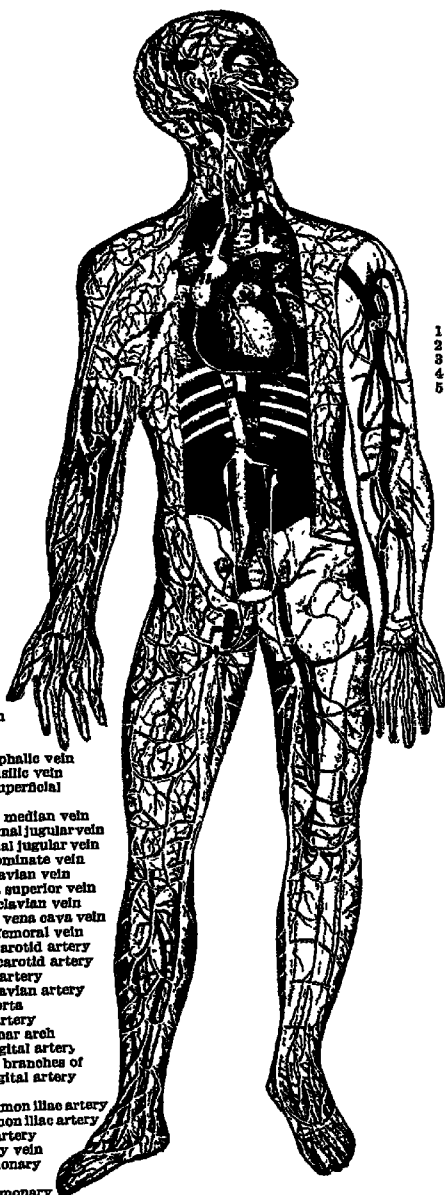
Related Articles. Consult the following titles for additional information:

Aorta	Arteries	Heart
Blood	Capillaries	Veins

CIRCUS. Among the ancient Romans a circus was a long building without a roof, in which public chariot races, exhibitions of pugilism and wrestling and other games took place. It was rectangular, except that one short side formed a half-circle; on both sides and on the semicircular end were the seats of the spectators, in tiers sloping backwards. On the outside the circus was surrounded with colonnades, galleries, shops and public places. There were eight or ten circuses at Rome, of which the largest was the *Circus Maximus*, 1,875 feet long and 625 feet wide, capable, according to Pliny, of containing 260,000, and according to Aurelius Victor, 385,000, spectators. At present, however, but few vestiges of it remain, and the *Circus of Caracalla* is in the best preservation. The games celebrated in these structures attained great importance and magnificence. Some of them were feats of skill such as are celebrated to-day—races, gymnastic contests, etc., with men of high rank engaged. Again, some of the spectacles were revolting to the modern mind. There were combats with wild beasts, in which beasts fought with beasts or with men, criminals or volunteers, an ex-

Veins and Arteries

- 1 Basilio vein
- 2 Superficial radial vein
- 3 Median cephalic vein
- 4 Median basilic vein
- 5 Anterior superficial ulnar vein
- 6 Superficial median vein
- 7 Right internal jugular vein
- 8 Left internal jugular vein
- 9 Right innominate vein
- 10 Left subclavian vein
- 11 Vena cava superior vein
- 12 Right subclavian vein
- 13 Ascending vena cava vein
- 14 Common femoral vein
- 15 External carotid artery
- 16 Common carotid artery
- 17 Coronary artery
- 18 Left subclavian artery
- 19 Arch of aorta
- 20 Brachial artery
- 21 Deep palmar arch
- 22 Palmar digital artery
- 23 Collateral branches of palmar digital artery
- 24 Aorta
- 25 Right common iliac artery
- 26 Left common iliac artery
- 27 Femoral artery
- 28 Pulmonary vein
- 29 Left pulmonary vein
- 30 Right pulmonary vein



External View of the Heart

- | | |
|------------------------|------------------------|
| 1 Aorta | 6 Right ventricle |
| 2 Pulmonary artery | 7 Left ventricle |
| 3 Descending vena cava | 8 Left coronary artery |
| 4 Right auricle | 9 Left coronary vein |
| 5 Left auricle | |



Scheme of the Circulation

- | | |
|------------------------------|-------------------------|
| 1 Heart | 10 Pulmonary artery |
| 2 Lung | 11 Ascending vena cava |
| 3 Head and upper extremities | 12 Descending vena cava |
| 4 Spleen | 13 Pulmonary vein |
| 5 Intestine | 14 Portal vein |
| 6 Kidneys | 15 Carotid artery |
| 7 Lower extremities | 16 Aortic arch |
| 8 Liver and portal vein | 17 Thoracic duct |
| 9 Aorta | |

Plate used by permission of the Caxton Company, Chicago

CIRCULATION OF THE BLOOD

Outline of the Circulation of the Blood

I. ORGANS

- (1) Heart
 - (a) Shape
 - (b) Size
 - (c) Position
 - (d) Weight
 - (e) Structure
 - (1) Parts
 - (2) Valves
 - (3) Action
 - (f) Nerve supply
 - (g) Function
- (2) Arteries
 - (a) Distribution
 - (b) Structure
 - (1) Coats
 - (2) Capillaries
 - (a) Definition
 - (b) Function
 - (c) Size
 - (d) Structure
 - (c) Circulation in arteries
 - (d) Anastomosing
 - (e) Pulse
- (3) Veins
 - (a) Definition
 - (b) Purpose
 - (c) Structure
 - (1) Coats
 - (2) Valves
 - (d) Circulation of the veins

II. SYSTEMS

- (1) Pulmonary
 - (a) From the right side of the heart
 - (b) Through the lungs
 - (c) To the left side of the heart
- (2) Systemic
 - (a) From the left side of the heart
 - (b) Through the body
 - (c) To the right side of the heart
- (3) Portal

III. BLOOD

- (1) Definition
- (2) Amount
- (3) Temperature
- (4) Composition
 - (a) Corpuscles
 - (b) Serum
- (5) Coagulation

(6) Functions

IV. CAUSES OF CIRCULATION

- (1) Force of heart
- (2) Elasticity of arterial walls
- (3) Contraction of the heart
- (4) Muscular action
- (5) Act of breathing

V. FUNCTIONS

- (1) Nourishment
- (2) Purification
- (3) Elimination of waste
- (4) Warmth

VI. HYGIENE

- (1) Air and sunlight
- (2) Exercise
- (3) Heat and cold
- (4) Pressure
- (5) Accidents

VII. DISEASES

- (1) Congestions
- (2) Inflammation
- (3) Scrofula
- (4) Colds
- (5) Catarrh

VIII. ASSOCIATED PROCESSES.

- (1) Absorption
- (2) Assimilation
- (3) Secretion
- (4) Excretion

Questions on Circulation

What is circulation? Name the organs of circulation.

Describe the heart Define arteries; veins.

Explain auricle and ventricle.

Describe the circulation of the blood

Of what is blood composed?

What are the uses of the blood? What is the normal temperature of the blood?

What is the color of the blood in the veins? In the arteries? What causes the change?

Describe coagulation What are the parts coagulated?

Give the functions of the red corpuscles

Distinguish between the pulmonary and systemic circulation.

What vein carries the blood to the liver?

How long does it take the blood to make a complete circuit of the system?

hibition which was especially attractive to the Romans. Under the Empire this kind of show was transferred to the amphitheater.

The expense of these games was often immense. Pompey, in his second consulship, brought forward 500 lions at one combat of wild beasts, which, with eighteen elephants, were slain in five days. These shows were free to the people, and their love for them appears from the cry with which they addressed their rulers: "Bread and the games."

The modern circus is a place where animals are trained to perform antics, and where exhibitions of acrobats and various pageantries, including a large amount of comic acting by clowns are presented for the amusement of the spectators. This form of entertainment has become especially popular. (See BARNUM, PHINEAS TAYLOR).

CIRRHOISIS, *sis ro'sis*, from Greek words meaning *orange-colored*, is the name applied to a disease of the liver, lungs, spleen, heart or stomach. The organ affected becomes somewhat hardened or fibrous, due to an increase of connective tissue, and undergoes gradual degeneration. There are two varieties of the disease; in one the organ decreases in size, and in the other it becomes larger. The liver is most frequently affected. See LIVER.

OSALPINE, *sis al'pin*, **REPUBLIC**, a state founded by Bonaparte in 1797 in Northern Italy. It included Lombardy, Mantua, Verona, Cremona, Brescia, Bergamo, Rovigo, the Duchy of Modena, Massa, Carrara, Bologna, Ferrara and the Romagna; it had in all an area of over 16,000 square miles and a population of 3,500,000. Austria recognized the republic in the Treaty of Campo Formio, but the new state was dissolved in 1799 by the victories of the Austrians and Russians. It was regained by Napoleon Bonaparte in 1800, took the name of the "Italian Republic" in 1802 and elected Bonaparte as President. Three years later it became the "Kingdom of Italy," with Napoleon as king, and it continued as such until 1814.

CISTERCIANS, an Order of monks, a branch of the Benedictines founded by Robert, abbot of Molseme, in 1098. The habit was white with a black scapular. The rules of the Order were very strict, and for the first century of its existence it included only a few members. Early in the thirteenth

century it was joined by Saint Bernard and thirty followers, and from that time on it grew rapidly. By the middle of the fourteenth century there were 700 abbeys located in France, Ireland, Spain, Portugal, Norway, Sweden and Germany. In recent times the Order has declined, and there are now only a few abbeys, principally in Italy and Austria. At the time of their greatest prosperity the Cistercians were much interested in literature and art and collected many manuscripts for their libraries. Their churches were distinguished by their simplicity and had no paintings or sculpture; but it is to them that the beginning of Gothic architecture may be traced.

CISTERN, *sis'tern*, a large tank, either above or below ground, for holding water. Cisterns may be made of wooden staves held together by hoops of iron, galvanized iron or other sheet-metal; they are also frequently made by lining the walls of an excavation in the ground with brick or cement. Cisterns are used for storing water in localities where the inhabitants have to depend upon rain water for domestic purposes, but not for drinking.

If a cistern is circular, with a flat base, the reader may learn how to ascertain how much it will hold by reference to the article Cylinder.

CITIES OF REFUGE, six out of the forty-eight cities given to the tribe of Levi in the division of Canaan, set apart by the law of Moses as places of refuge for the manslayer or accidental homicide. Their names were Kedesh, Shechem and Hebron, on the west side of Jordan; and Bezer, Ramoth-Gilead and Golan, on the east. No part of Palestine was far from a City of Refuge. The manslayer fled to the nearest one, where he was guaranteed a fair trial, safe from personal or mob fury; if not guilty of wilful murder he could remain in the city.

CITIZEN, a member of an organized political society, as a state or nation. Originally, a citizen was any one entitled to share in the management of a city-state, but gradually the limits of citizenship have been extended until now, in modern republics, almost every resident is a citizen. In the monarchies of Europe the term is used to denote a resident of a municipality, the citizen's relations to the state being expressed by the word *subject*. In the United States a citizen is one who owes allegiance and sup-

port to the government and is entitled to its protection; it includes women, children, criminals, persons of all races except alien residents. Citizens are of two classes; they are *natural-born*, that is, born within the jurisdiction of the country, or *naturalized*, that is, have taken legal steps to renounce allegiance to their former country and swear fealty to the country of their adoption.

Citizenship does not imply the right to vote, for the latter may be withheld or granted to classes or individuals at the will of the government. Women are citizens (the old name for a female citizen was *citess*), but not everywhere are they entitled to vote (see WOMAN SUFFRAGE).

CITRIC, *si'trik*, ACID, the acid of lemons, limes and some other fruits. It is generally prepared from lemon juice, and when pure it is white, inodorous and extremely sharp in its taste. In combination with metals it forms crystalline salts, known as citrates. The acid is used to prevent the formation of colors not wanted in calico printing; it is also used as a substitute for lemon juice in making beverages, and for allaying thirst in fever.

CITRION, a large, sour fruit, much like a lemon, but scarcely edible, unless preserved in sugar. The citron tree is small, and has been a favorite since the days of ancient Rome. In the United States it is cultivated only in Florida and California. The name *citron* is also given to a small, hard watermelon that is used for pickles and preserves almost everywhere.

CITRUS, an important genus of about thirty plants that includes the orange, citron, lemon, lime, grapefruit and other fruit trees and shrubs, all of which are described in this work under their common names. The citrus plants have rather long, pointed leaves or leaflets, united by a distinct joint to the leaflike stalk; their stamens are united by their filaments into several irregular bundles, and they have pulpy fruits with spongy rinds.

CITY, in the commonly-accepted sense, a large town, but there are no legal restrictions governing the application of the term. In America a city is a thickly-populated section, with legally-defined boundaries, divided into small political units called *wards*, each ward electing one or two men called *aldermen* who join with aldermen from

other wards in forming the *common council* or *board of aldermen*, who pass laws called *ordinances* for the government of the community. At the head of the executive department is the *mayor*, whose duty is to enforce all city laws faithfully. Other officers are *city clerk*, *city treasurer*, *assessor*, etc., who, with the mayor and aldermen, are elected by the people. Still other officials are appointed to fill other stations, such as street commissioner, police chief, and the like.

There is no legal rule by which it is determined when a village or town is large enough to become a city. It is believed that Oak Park, Ill. (Chicago suburb), population, 64,000, is the largest town in the world adhering to village government, it prefers not to be a city. In Michigan, another town, 875 population (1930 census) preferred to become a city, with two wards. The people of each community decide for themselves when they wish a city government, at which time they apply for a *charter* from the state. The charter is a constitution under which the municipality is to be governed.

As a village, a community cannot do many things a city is permitted to do. It cannot go into debt beyond a certain moderate sum for public improvements, while a city may borrow money and issue bonds for repayment for much larger amounts. As a town grows large the ward system of representation in the local law-making body is preferred to the village common council plan, which can have but six members in its legislative body.

One of the peculiar developments of modern times is the centralization of population in cities. Consequently there have arisen certain striking characteristics of city life. The city has become the center of culture and commerce, but at the same time it is often the center of poverty and degradation. It is therefore the breeding place of class antagonism, of criminal influence and of disease. Side by side with these developments have arisen problems which constitute some of the most important social, economic and political questions of the time. See COMMISSION FORM OF GOVERNMENT; CITY PLANNING, CITY MANAGER.

Fifty Largest Cities of the World. In countries where the census is taken regularly and can be relied upon, the census figures are given; in other instances, particularly af-

fecting Chinese and African cities, careful estimates, based on the best available information, are given:

1. London, 3,302,318	28. Birmingham, 1,002,413
2. New York, 6,930,446	29. Peiping, 1,000,000
3. Tokyo, 5,312,000	30. Mexico, 1,000,000
4. Berlin, 4,190,847	31. Milan, 992,000
5. Chicago, 3,376,438	32. Nagoya, 907,000
6. Shanghai, 3,259,000	33. Cleveland, 800,429
7. Paris, 2,371,039	34. Canton, 800,000
8. Moscow, 2,781,300	35. Madrid, 896,000
9. Osaka, 2,453,573	36. Brussels, 886,000
10. Leningrad, 2,228,000	37. Sao Paulo, 879,788
11. Buenos Aires, 2,100,000	38. Liverpool, 855,539
12. Rio de Janeiro, 2,080,000	39. Prague, 850,000
13. Philadelphia, 1,950,981	40. Hong Kong, 840,200
14. Vienna, 1,886,000	41. Naples, 840,000
15. Detroit, 1,568,662	42. St. Louis, 821,960
16. Calcutta, 1,419,300	43. Montreal, 818,557
17. Budapest, 1,400,000	44. Baltimore, 804,874
18. Tientsin, 1,387,000	45. Kobe, 787,000
19. Sydney, 1,238,660	46. Boston, 781,188
20. Los Angeles, 1,238,048	47. Barcelona, 775,000
21. Warsaw, 1,178,000	48. Copenhagen, 770,000
22. Bombay, 1,157,851	49. Manchester, 766,333
23. Hamburg, 1,143,000	50. Amsterdam, 760,000
24. Glasgow, 1,088,000	
25. Cairo, 1,064,000	
26. Melbourne, 1,020,000	
27. Rome, 1,008,000	

Fifty Largest Cities in the United States.

Within recent years the Census Bureau has issued annual estimates of the growth of cities. These are based on the average increase in population from decade to decade and do not take into consideration unusual local conditions which may rapidly increase population. The figures below are according to the Federal census of 1930:

1. New York, 6,930,446	22. Rochester, 328,132
2. Chicago, 3,376,438	23. Jersey City, 316,715
3. Philadelphia, 1,950,981	24. Louisville, 307,745
4. Detroit, 1,568,662	25. Portland, 301,815
5. Los Angeles, 1,238,048	26. Houston, 292,352
6. Cleveland, 800,429	27. Toledo, 290,718
7. St. Louis, 821,960	28. Columbus, 280,564
8. Baltimore, 804,874	29. Denver, 287,861
9. Boston, 781,188	30. Oakland, 284,063
10. Pittsburgh, 669,817	31. St. Paul, 271,606
11. San Francisco, 634,394	32. Atlanta, 270,366
12. Milwaukee, 578,249	33. Dallas, 260,475
13. Buffalo, 573,076	34. Birmingham, 259,878
14. Washington, 486,869	35. Akron, 255,040
15. Minneapolis, 464,356	36. Memphis, 253,143
16. New Orleans, 458,762	37. Providence, 252,981
17. Cincinnati, 451,160	38. San Antonio, 231,642
18. Newark, 442,337	39. Omaha, 214,006
19. Kansas City, 399,746	40. Syracuse, 209,326
20. Seattle, 365,583	41. Dayton, 200,982
21. Indianapolis, 364,161	42. Worcester, 195,311
	43. Oklahoma City, 185,389
	44. Richmond, 182,929
	45. Youngstown, 170,002

46. Grand Rapids, 169,592	48. Fort Worth, 163,447
47. Hartford, 164,072	49. New Haven, 162,555
	50. Flint, 156,492

Fifty Largest Cities in Canada. The last regular decennial census in the Dominion was taken in 1931. By this census the fifty largest cities in Canada are:

1. Montreal, 318,577	32. Moose Jaw, 21,399
2. Toronto, 321,207	33. Guelph, 21,075
3. Vancouver, 246,598	34. Glace Bay, 20,706
4. Winnipeg, 218,785	35. Moncton, 20,689
5. Hamilton, 155,547	36. Port Arthur, 19,818
6. Quebec, 130,594	37. Niagara Falls, 19,046
7. Ottawa, 126,872	38. Lachine, 18,680
8. Calgary, 83,761	39. Sudbury, 18,518
9. Edmonton, 79,197	40. Sarnia, 18,191
10. London, 71,148	41. Stratford, 17,742
11. Windsor, 63,108	42. New Westminster, 17,524
12. Verdun, 60,745	43. Brandon, 17,082
13. Halifax, 59,275	44. St. Boniface, 16,305
14. Regina, 53,209	45. North Bay, 15,528
15. St. John, 47,514	46. St. Thomas, 15,430
16. Saskatoon, 43,291	47. Shawinigan Falls, 13,345
17. Victoria, 39,082	48. Chatham, 14,569
18. Three Rivers, 35,450	49. East Windsor, 14,251
19. Kitchener, 30,793	50. Timmins, 14,200
20. Brantford, 30,107	
21. Hull, 29,433	
22. Sherbrooke, 28,933	
23. Outremont, 28,641	
24. Fort William, 26,277	
25. St. Catherine's, 24,765	
26. Westmount, 24,235	
27. Kingston, 23,439	
28. Oshawa, 23,439	
29. Sydney, 23,089	
30. Sault Ste. Marie, 23,082	
31. Peterborough, 22,327	

CITY MANAGER, an official appointed by the board of aldermen or common council of a city to manage all its business affairs. Such a system is a modification of the commission form of government (which see), and is the most modern step yet devised in the direction of centralizing authority and responsibility. The city manager is the one man accountable to all the citizens for the conduct of the public affairs of the town, with authority to hire and to discharge subordinates. He is paid a good salary, and he receives his appointment because of ability and fitness, often after a competitive examination. Small cities pay \$1,500 to \$2,000 per year; large cities, as much as \$6,000 to \$20,000, or more. Dayton, Ohio, was the first large city to adopt the plan (1914). Over four hundred cities in the United States have adopted the plan, or modifications of it, besides several cities in Canada. Among the large cities using it are Cincinnati, Rochester and Kansas City.

How to Study a City

A topical outline of a city is given below. It is subject to such amendment as may be necessary to meet local needs:

THE CITY

I. MAP OF CITY

II. DESCRIPTION

- (a) Area and population
- (b) Location
 - (1) In township
 - (2) In county
 - (3) In state
 - (4) Direction from other cities

III. GOVERNMENT

- (a) Chief executive
 - (1) Title
 - (2) How chosen
 - (3) Length of term
 - (4) Duties
- (b) Other officers
 - (1) Financial
 - (a) Treasurer
 - (b) Assessor
 - (c) Collector of taxes
 - (2) Clerk
 - (3) Judicial
- (c) Appointive officers
 - (1) Health
 - (2) Education
 - (3) Parks
 - (4) Streets
 - (5) Water Superintendent
 - (6) Fire
 - (7) Police

IV. EDUCATION

- (a) Board of education
- (b) Superintendent of schools
- (c) Public schools and buildings
- (d) Private institutions

- (1) Kinds
- (2) Endowments
- (3) Rank among other schools of same kind

V. PUBLIC UTILITIES

- (a) Rail and water communication
- (b) Street railways
- (c) Water supply
- (d) Lighting systems; how owned
 - (1) Electric light
 - (2) Gas

VI. PARKS AND BOULEVARDS

- (a) Parks
 - (1) Number
 - (2) Area
 - (3) How controlled
 - (4) How supported
- (b) Boulevards
 - (1) Extent
 - (2) Special rules governing

VII. COMMERCE AND INDUSTRY

- (a) Banking strength
- (b) Manufactured articles
 - (1) Kinds
 - (2) Market
 - (3) Annual value
 - (4) Persons employed in manufactures
 - (5) Wages paid annually

VIII. STUDY OF CHARTER

IX. HISTORY

- (a) When settled
- (b) Date of organization as a village
- (c) Date of change to city government
- (d) Notable events
- (e) Persons more than locally known

CITY PLANNING. Formerly cities grew to large proportions without concerted action of their people to build for the highest good and to the best advantage of the community. Little attention was paid to features which would make for public convenience, civic beauty, health and demands of an esthetic nature. The path the calf made through the primeval forest became the main street of the village and eventually the leading thoroughfare of the city. From this in all directions grew the town, often in haphazard fashion.

People have awakened to the error of this irresponsible development, which has been excused because of rapid growth under pioneer conditions. They are learning that definite plans for city development are profitable, and properly carried out make for happiness, health and prosperity.

Accordingly, city plan commissions, headed by competent men—architects, landscape gardeners, builders, sanitary experts—exist now in many cities. Their duty is to enforce growth along lines which shall ultimately be

of greatest benefit to all the people. They provide for expansion of business—retail, wholesale, factory sections—in such parts of town as shall be most convenient and least objectionable; they determine where transportation is needed; where streets and parks shall be placed; how buildings shall be constructed with respect to light, air and sanitation.

Instances are at hand of cities which have demolished miles of buildings in order to work out new plans for streets, boulevards and parks. Such radical steps were taken in Chicago to afford egress from the crowded "loop" district to residence sections. The city of Washington took steps to halt ill-advised development and to build hereafter on plans proposed many years ago. San Francisco, after the disaster of 1906, rebuilt on scientific plans. The new capital city of Australia, Canberra, was built according to a plan previously outlined.

CITY STATE, a state whose boundaries are the limits of a single city. In such a state the political life of the state and the city are identical. No such organization exists today. Great ancient examples were Athens and Rome. In the Middle Ages five Italian towns were city states—Milan, Genoa, Venice, Florence, and Naples. In the old city state its people owed allegiance to the city that was their home rather than to the country in which it was located; for example, Athenians owed first allegiance to Athens, not to Greece. The nearest modern examples were the free cities of Hamburg, Bremen, and Lubeck, but their peculiar distinction was lost in 1934, under Nazi decree.

CIVET, *siv'et*, or **CIVET CAT**, an animal resembling both the weasel and the fox, found in North Africa and in Asia from Arabia to Malabar and Java. It is from two or three feet long and ten inches high, and of a grayish color, tinged with yellow and marked by dusky spots in rows. Civets prey upon birds and small animals, and they are also fond of the eggs of the crocodile. The body of the civet contains a pouch in which is found a fatty substance which smells like musk. This substance is used in making a valuable perfume.

CIVIL DEATH, the extinction by law of a man's rights as a citizen. A criminal sentenced to be executed suffers civil death as soon as sentence is passed upon him. Imprisonment for life is in effect civil death;

in New York state this condition is emphasized by the fact that a life sentence to prison operates automatically as a divorce of the condemned from his wife, if he is a married man. Every tie that binds him to the world is severed.

CIVIL GOVERNMENT, a term which means a government in the control of its citizens, from the Latin *civis*, meaning *citizen*. This definition does not imply that all citizens participate directly in the conduct of affairs, for that is manifestly impossible; it means that the source of all power is in the people, and that they delegate actual control to representatives whom they choose for this task. The basis on which such a government rests is a written instrument called a constitution.

Civil government as it relates to the great business of conducting affairs which pertain to the entire United States is outlined in the diagram accompanying this article.

Related Articles. Consult the following titles for additional information:

GENERAL

Allen	Income Tax
Annexation	Inheritance Tax
Australian Ballot	Internal Revenue
Autonomy	Land, Public
Ballot	Law
British North America	National Debt
Act	Naturalization
Caucus	Passport
Chargé d' Affaires	Primary, Direct
Charter	Privy Seal
Citizen	Province
Civil Death	Recall, The
Coast Guard	Registration
Conservation	Republic
Constitution	Reputation
Constitution of the	Seal
United States	Single Tax
Customs Duties	Sovereignty
Diplomacy	Squatter Sovereignty
Election	Stamp
Electoral Commission	State
Exterritoriality	Subsidy
Extradition	Suffrage
Flag	Tariff
Forest and Forestry	Tax
Forests and Forest	Territory
Reserves in Canada	Toll
Franchise	Treason
Freezing	Treaty
Free Trade	Voting Machine
Government	Woman Suffrage
Imperialism	

LOCAL

Alderman	County
Burgomaster	Fire Department
City	Garbage
City Manager	Mayor
City Planning	Municipal Government
Commission Form of	Municipal Ownership
Government	Police
Commune	Poll Tax
Constable	Sheriff
Coroner	Town Meeting

EXECUTIVE

Agriculture, Depart-	Civil Service
ment of	Civil Service
Ambassador	in Canada
Bureau	Commerce, Depart-
Cabinet	ment of
Census	Consul

UNITED STATES GOVERNMENT

LEGISLATIVE

(Congress)

Senate
Membership—Two Senators from each state.

Qualifications
Thirty years of age
Nine years a citizen of the United States
A resident of state from which he is chosen

Chosen directly by the people.
Term—six years
Salary of members—\$10,000.

House of Representatives

Membership
How number of members is determined

Qualifications
Twenty-five years of age
Seven years a citizen,
A resident of state from which chosen.

Chosen directly by the people
Term—two years
Salary of members—\$10,000.

Chosen by electors

Qualifications
Thirty-five years of age
Natural-born citizen.

Term—Four years
Salary—\$75,000

Sole Powers and Duties

Powers Combined with Senate Approval

Supreme Court
Chief Justice and eight Associate Justices
Appointed by President
Term—for life, or during good behavior
Salary—\$20,500 and \$20,000.
Extent of power To all cases

Inferior Courts
United States Circuit Courts,
United States District Courts
United States Court of Claims.

Powers of Congress
Power to Declare Congress

borrow money, coin money and fix value thereof
Regulate commerce with foreign nations and with Indian tribes
Establish bankruptcy laws and naturalization laws Punish counterfeiting
Establish and maintain postoffices and postroads
Grant patents and copyrights
Establish courts inferior to Supreme Court
Declare war, grant letters of marque and reprisal, make rules concerning
naval, militia, army
Raise and support armies, provide and maintain a navy,
Provide for militia and power to call it into service.
Exercise full control of District of Columbia.

Cannot pass ex post facto laws.
Cannot grant titles of nobility
Cannot enact direct taxes except as they are made uniform.
Cannot levy a tax on exports from any state
Cannot suspend writ of habeas corpus, except in rare emergency.

Commander-in-chief of army and navy
Fill vacancies during recess of Senate
Recommend needed legislation to Congress
Adjourn Congress, when Senate and House cannot agree upon date
Must exercise all the laws of Congress
Make treaties with foreign nations
Appoint civil officers not under Civil Service Appoint judicial officers.

of law and equity existing under Constitution,
affecting ambassadors and other public ministers;
affecting jurisdiction on the high seas,
in which the United States is a party
between a state and citizens of another state,
between citizens of different states,
between a citizen and citizens of a foreign state.

EXECUTIVE

(The President)

JUDICIAL

Crown	Navy, Department
Czar	of the
Dauphin	Nazi-ism
Dead-letter Office	Pardon
Dictator	Pasha
Divine Right	Post-office Department
Doge	Premier
Education, Office	President
of, Commissioner	Prince
of	Privy Council
Electoral College	Queen
Emperor	Rajah
Exchequer, Chancellor	Regent
of the	Royal Canadian
Executive Department	Mounted Police
Governor-General	Sanitary Commission
Imperator	Secret Service
Interior, Department	Sheik
of the	Statholder
Kaiser	State, Department of
Khan	Sultan
Khedive	Supremacy, Royal
King	Theocracy
Labor, Department of	Treasury
Lieutenant-Governor	Veto
Majesty	Weather Bureau
Mikado	Vice-President
Mint	War, Department of

LEGISLATIVE

Amendment	Legislature
Assembly	Lobby and Lobbying
Bundesrat	Local Option
Civil Law	Parliament
Common Council	Pure Food Laws
Congressional Record	Reichstag
Congress of the	Representatives,
United States	House of
Congressman at	Senate
Large	Senate of the United
Diet	States
Duma	Short Ballot
Executive Council,	Speaker
in Canada	Statute
Initiative and	Zemstvo
Referendum	

JUDICIAL

See Court

CIVILIZATION. French scholars of the eighteenth century adopted this term and gave it its present meaning. They thought that civilization stands in contrast to feudalism and the crude life of the early middle ages and that it always denotes a rich development in knowledge and education.

Today we prefer to contrast civilization with life among savages who in many respects live always far below the level of the people of the middle ages in Europe.

Civilization Described. Perhaps an explanation of certain characteristics of civilization will serve our purpose. A civilized person fits into society at very many points; he shares in home life; he follows one or more occupations; he appreciates art of many kinds; he takes a part in government.

Civilization is not handed down through natural inheritance from one's parents. Of course neighboring peoples show racial differences and certain traits inherited from ancestors, but such matters as languages, mechanical skill and good business judgment are not given to us by heredity.

Civilization is not a fixed and stable product. It is a growth that depends on many

circumstances and which may be hindered and even stopped entirely. The Roman civilization developed through a thousand years and then declined and disappeared. There are many forces that work against civilization. And yet when it has been "destroyed" its best features reappear in the life of later nations; this happened in the case of the civilization of the Incas in Peru.

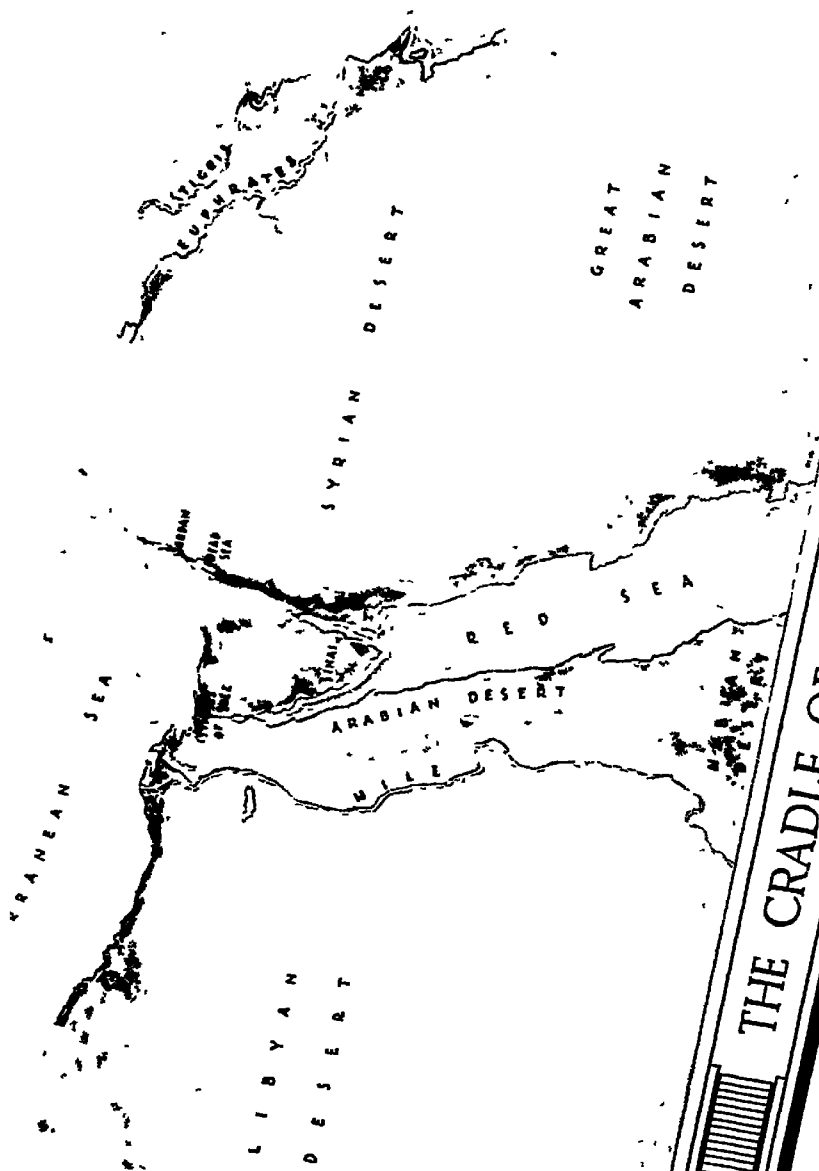
How Civilization Arose. Sooner or later we must face the question, "Did civilization arise in one place and then spread from nation to nation?" There are many similarities in language, customs and ways of thinking which seem to indicate that all men derived these features from a common center. On the other hand a closer examination makes it clear that no race has a sure claim to superior intelligence and that inventive and pioneering minds arise in many parts of the inhabited world. It is necessary to admit then that civilization sprang up in different places and in different periods of human history.

Progress in Civilization. All peoples and tribes possess some degree or traces of civilization; all civilizations exhibit progress during some periods of their history although the rate of progress may be slow at times. This change from rapid to slow development discloses among other things the competition between the conservative and the progressive members of society. When the people respect very highly the accomplishments of centuries past, scholars like the learned men of old China take the lead in society and civilization is slowed down.

As civilization advances duties and many kinds of labor are distributed among individual persons and cooperation on a large scale becomes necessary. In this way priests, scientists, lawyers, merchants, artists, government officials, teachers, find their places in society. Civilization thus becomes very complex and the increase of knowledge is beyond calculation.

Civilization requires that the individual surrender many of his desires, but he gains much from so doing.

Prominent Features in Civilization. Some of the factors that contribute to civilization and which help to fix its character are the following: The special bodily structure of man with his special senses, his feet and his highly developed hands; the close relation of geographical position to



THE CRADLE OF CIVILIZATION

G.S.M.

men's occupations, language as a means of exchanging ideas; literature in which men like Homer, Dante, John Bunyan, the authors of the Ramayana of India and of the Bible have molded centuries of human history, great ideals such as the brotherhood of man, service, progress and justice; leaders of heroic character such as Moses, Alexander the Great, Pericles, Saint Augustine, Alfred the Great, Shakespeare, Blackstone the jurist, Frances Willard and Jane Addams; great institutions such as Christianity, government and the home.

In the study of civilization one must sketch the developments in methods of gaining food, carrying on agriculture, domestication of animals, control of fire, mining, metal working, textiles, architecture, music, domestic arts, commerce, medicine, religion and morals.

Civilization promotes the development of countless social institutions such as colonization schemes, emancipation of slaves, conservation of natural resources, crusades and world-wide campaigns, constitutions for governments, trial by jury, international organizations and the laws of nations.

H. L. L.

Related Articles. Consult the following titles for additional information

Age of Man	Cliff Dwellers
Anthropology	Economics
Architecture	Education
Arms and Armor	Esthetics
Arts and Crafts	Evolution
Bible	Gibbons
Biography	Government
Book	Guizot
Bronze Age	Hegel
Buckle	Internationalism
Buddhism	Jesus Christ
Burbank	Literature
Burroughs	Philosophy
Byzantine Art	Pope
Calendar	Religion
Carnegie	Science and the
Cathedral	Sciences
Cave Dwellers	Sociology
Chautauqua	State
Children	Universal Language
Societies for Chivalry	University
Christianity	Woman Suffrage

CIVIL LAW, that code of law which deals with a man's relations with his fellow man, in which the state's only interest is to see that justice rules their conduct towards one another. *Civil* is from the Latin *civis*, meaning *citizen*, civil law is thus explained. It differs from criminal law in that the state becomes responsible for the safety of its citizens against those who commit crimes; the state cannot delegate corrective responsibility to individuals for crimes against the whole people.

If a violation of law affects the welfare only of the persons directly concerned, as when a man refuses to pay a debt or when one person trespasses upon the land of another, civil laws are invoked. A robbery or a murder, on the other hand, renders the whole community unsafe, and criminal laws are invoked; the state then becomes the prosecutor in behalf of the people. See **LAW**.

CIVIL LIST, a statement of appropriations for support of royal houses of Europe, for which appropriations are made yearly by legislative bodies.



CIVIL SERVICE, a term applied to all service rendered to and paid for by a nation in the conduct of public business, not applying, however, to those engaged in the army and navy and in legislative and judicial positions. It is *citizen service*. It includes within its classification the great number of clerks, stenographers, typists, bookkeepers, messengers, post-office employees, etc., required to keep the public

records and serve the public as required by law.

Should a new manager assume charge of a great factory it would be a calamity were he to discharge all employees whose political opinions were not in accord with his views. However, for many years the important business management of the United States was conducted on such a basis. A newly inaugurated President might find that many thousands of minor employees were not members of his political party, having been appointed under a different political régime. This condition, while it in no way affected the public welfare, served as a reason for discharging them and filling their places with men and women who were in political accord with the new administration. Thus it might occur that a vast working force might be changed every four years, to the positive detriment of the country. While merit should have been the determining factor even in political appointments, there was formerly such clamor for office that often party service rather than ability was re-

ognized, to the utter demoralization of the routine of public business and distress of worthy employes.

All the presidents from Washington to John Quincy Adams, inclusive, had caused the discharge of only 112 government employes, in each case for a substantial reason. Andrew Jackson and his followers, in 1829, inaugurated a new system, to reward those who had worked for the Jackson party at the election; they believed that "to the victors belong the spoils of office." Thousands of experienced employes were dismissed. Succeeding administrations adopted the same policy. The custom was at length acknowledged to be detrimental to public policy, from the standpoints of efficiency and justice to employes, and because a new President was obliged to spend upon office-seekers much valuable time needed for serious matters. In 1840 Horace Greeley wrote from Washington:

"We have nothing new here in politics, but large and numerous swarms of office-hunting locusts sweeping into Washington daily, all the rotten land speculators, broken bank directors, swindling cashiers, etc., are in full cry for office, office, and even so humble a man as I am is run down by letters, letters"

Office seekers, it is claimed, hastened the death of President William Henry Harrison in 1841. From that time the evils of party appointments and office-seeking grew steadily, until by 1870 it had undermined the efficiency of government administration.

Reform in Civil Service. General Grant, in 1872, undertook to suppress the evil, and, with the consent of Congress, he appointed a commission to make rules and regulations for admission to and continuance in the civil service. The rules reported, however, by this commission were never carried out to any considerable extent, on account of the political pressure which was brought to bear on Congress. President Hayes undertook to carry out Grant's plan, and a reform was instituted in several of the large postoffices of the country.

In January, 1883, Congress authorized the President to appoint, with the advice and consent of the Senate, three civil service commissioners, whose duty was to aid the President in preparing suitable rules providing for open, competitive examinations for testing the fitness of applicants for the public service, such examinations to be practical in their character, and, so far as might

be, to relate to those matters which would fairly test the relative capacity and fitness of the persons examined, to discharge the duties of the service.

Rules of the Civil Service. Information respecting the rules of the national civil service and the nature of the date for civil service examinations may be obtained at nearly every postoffice or by addressing the Civil Service Commission, Washington, D. C.

CIVIL SERVICE IN CANADA. The civil service of Canada is controlled by a Civil Service Commission, whose office is at Ottawa. This commission, composed of three members and a secretary, is appointed by the Governor-General in Council. Its duties are to test and pass upon the qualifications of candidates for admission and promotion; the actual work of examination is done by examiners under the control of the commission. The commission's powers also include the right to investigate the operation of the civil service laws, either independently or at the request of the minister or of the Governor-General.

The service is divided into two great branches known as the *inside* and the *outside* service. The *inside* service includes the employes of the executive departments at Ottawa, and the employes in a number of offices, such as those of the Auditor-General, the Governor-General's secretary, etc. The *outside* service includes the rest of the public service, such as the customs' officials, railroad and post-office employes. Thus the civil service list includes practically all the employes of the Dominion government except the heads of the departments.

Though the details of the classification and qualifications are too numerous to consider here, one fact of great importance must be noted. Members of the civil service pay five per cent of their salaries into a retirement or pension fund. The Governor-General in Council grants a pension from this fund to any person "who has served in an established capacity in the civil service for ten years or upwards, and who has attained the age of sixty years or become incapacitated by bodily infirmity from properly performing his duties." After a service of ten years an employe is granted a pension of ten-fiftieths of his average salary for the last three years; for each year of service over ten and up to thirty-five he is entitled to an additional one-fiftieth. If a person

dies while in the service, the amount to his credit in the retirement fund is paid to his legal heirs.



CIVIL WAR IN AMERICA, the great struggle from 1861 to 1865 between the Southern and the Northern states of the Union. The fundamental cause of the war was the growth of the institution of slavery in the South, after it had long been practically abolished in the North. This led to important differences of economic and political opinion and, especially, to the emphasis in the South of the principle of states' rights.

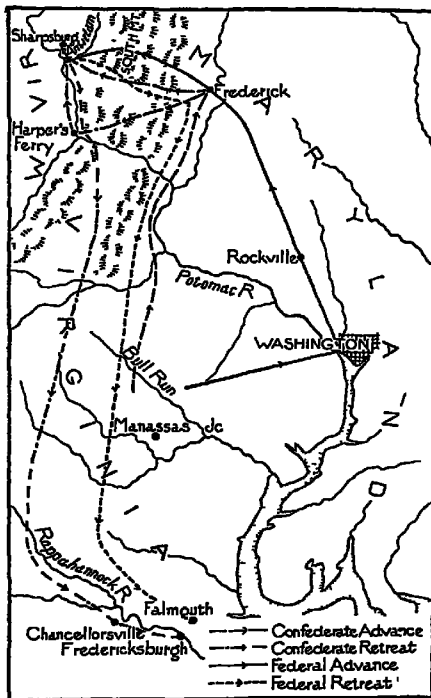
The natural outgrowth of such a belief was the doctrine of secession, and this was ultimately adopted. Between December 20, 1860, and February 1, 1861, the seven states of South Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana and Texas passed ordinances of secession. On February 4, the government of the Confederate States of America was organized, and by July four other states, Virginia, North Carolina, Tennessee and Arkansas, had joined this new union.

In spite of numerous attempts at compromise, the war was meantime opened by the seizure on the part of Southern states of United States forts and arsenals, a step which had been made easy by the Southern sympathies of members of Buchanan's Cabinet. The first gun was fired at Fort Sumter, in the harbor of Charleston, S. C., on April 12, 1861, and the fort surrendered on the same day. Immediately after this event (April 15), President Lincoln called for 75,000 volunteers and declared the coast of the Southern states to be under blockade. The Confederacy also issued a call for volunteers and retaliated for the blockade by issuing letters of marque and reprisal.

The border states of Missouri, Kentucky, Maryland and Delaware were of immense importance to both parties, and steps were immediately taken to secure control of them. They at first remained neutral, but they later joined the Union cause.

The Year 1861. The first real military

movements of the war occurred in the western part of Virginia, each government desiring to hold this territory as a buffer against the operations of the other. The Confederates were soon driven from the region by General McClellan. The next important event was the first Battle of Bull Run, which resulted from an attempt on the part of General Irving McDowell to begin a campaign for the capture of Virginia. It resulted in a disastrous Federal defeat. Thereafter, General McClellan was called



FIRST INVASION OF THE NORTH

from West Virginia to take charge of the Federal troops, but he occupied the remainder of the year in increasing, drilling and equipping his force. A Federal force under Benjamin F. Butler suffered an important defeat at Big Bethel, and another force was almost completely destroyed at Ball's Bluff. Meantime, the State of Missouri was being saved to the Union by the activity of General Lyon, and in spite of a severe defeat at Wilson's Creek, in which Lyon was killed, the Federals under General

Curtis drove the Confederates from the territory.

Events of 1862. The year 1862 opened with rather gloomy prospects for the Union. The military situation improved in the spring, however, and at Mill Spring a decisive victory for the Federals under Thomas practically cleared Kentucky of Confederate soldiers. In February a Union force under General Grant, with the aid of a river fleet under Commodore Foote, captured Forts Henry and Donelson, with about 15,000 prisoners and vast amounts of ammunition, artillery and supplies. In April occurred the Battle of Shiloh, in which, after a terrible struggle, the Federals under Grant were victorious, and the able Confederate general, A. S. Johnston, was killed. A few days after the Battle of Shiloh the Federals occupied Corinth, an important strategic position. Late in the same month a large Union force under General Butler, ably assisted by Admiral Farragut with a fleet, reduced the forts guarding New Orleans and took possession of the city. About the same time, General Polk and Commodore Foote were capturing the important Confederate position on

(renamed the *Virginia*) occurred in Hampton Roads. (See MONITOR AND MERRIMAC.)

In the early spring of 1862, General McClellan, with the Army of the Potomac, undertook the first general land campaign of the war, in an effort to fight his way to Richmond and capture the city, which had been made the Confederate capital. After a campaign lasting for more than four months, of which the last month witnessed almost continuous fighting, the Federals were compelled to abandon the project, leaving Lee, the great Confederate chieftain, in practical control of the state of Virginia. Another campaign to the same end was immediately undertaken by General Pope; but on August 30, at the old battlefield of Bull Run, the Confederates won another hard-earned but complete triumph. After the second Battle of Bull Run, Lee determined upon a bold invasion of the North, in order to gain the border state of Maryland and to win a victory in the enemy's country, in the hope of making that victory the basis of terms of peace. He advanced into Maryland without serious opposition, but was overtaken at South Mountain, September 14, where a determined battle raged for a few hours. On the following day another fierce conflict was fought near Sharpsburg on Antietam Creek, and as a result Lee was compelled to retreat into Virginia and abandon his projected invasion. However, the Union army, besides its losses in battle, lost 12,000 men who had been captured by "Stonewall" Jackson at Harper's Ferry.

After Antietam, McClellan, on account of his dilatory tactics, was superseded as commander of the Army of the Potomac by General Burnside. The army fought but one battle under its new commander. This was at Fredericksburg, where the Federals attacked a strong Confederate position and

suffered terrible slaughter without gaining any advantage. Meanwhile, in the west the Confederates had made determined efforts



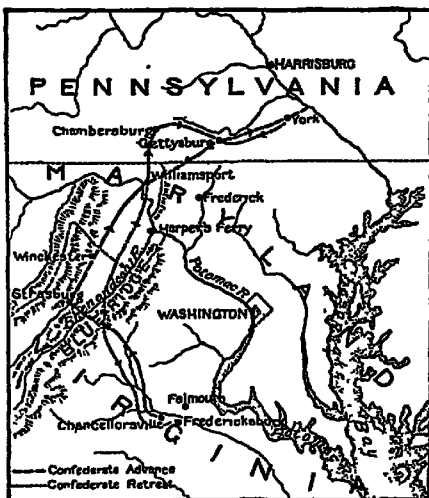
MILITARY OPERATIONS IN THE WEST IN 1862

Island No. 10. It was during the month of March of this year, also, that the famous battle between the *Monitor* and the *Merrimac*

to regain Kentucky and Tennessee. General Bragg, with about 45,000 men, had marched into the state, occupying important positions, but was defeated at Perryville by General Buell and compelled to retreat, while Rosecrans had repulsed a determined attack by Van Dorn at Corinth. Rosecrans succeeded Buell as commander of the Army of the Cumberland, and on the last day of the year he met Bragg's army, which had returned to Tennessee, at Murfreesboro. After a terrific three days' battle the Confederates retreated.

Events of 1863. The year 1863 witnessed the crucial campaigns of the struggle, the turning point of the war. In the east, Burnside was succeeded by Joseph Hooker. At Chancellorsville Lee inflicted on Hooker a terrible defeat, and the victories at Chancellorsville and Fredericksburg encouraged Lee to make another invasion of the Northern states. The two armies therefore advanced northward on opposite sides of the Blue Ridge, each hastening to be the first to cross the Potomac. Just before the crucial point of this campaign, Hooker was relieved and Meade was placed in command of the Federal army. He immediately crossed the Potomac and harassed Lee until he was forced to give battle. This was at Gettysburg on July 1 to 4, where, after one of the most important combats of modern times, the Confederate advance was checked. This Federal victory was almost duplicated on exactly the same day at Vicksburg in the southwest, where U. S. Grant had been conducting a long siege and bombardment. The Confederate General Pemberton surrendered on July 4. In the same month, Port Hudson surrendered to General Banks, and within a few weeks the Mississippi River was freed from Confederate control. The year of 1863 witnessed important events in the states of Kentucky and Tennessee. First was the Battle of Chickamauga, in which the Federal Army of the Cumberland under Rosecrans was almost completely destroyed by the Confederates under Bragg. Soon afterwards, Grant became head of the Department of the Mississippi, which included all the western armies, and in November he directed the great Battles of Chattanooga, including the celebrated "Battle above the Clouds" and the gallant storming of Missionary Ridge, by which the Confederates were completely routed.

Grant in Command. In the following spring, Ulysses S. Grant, who had displayed remarkable ability in the west, was made commander in chief of all the armies of the Union and took personal charge of the Army of the Potomac in Virginia. Under his



SECOND INVASION OF THE NORTH

direction an army of 100,000 men under General Sherman was to advance from Chattanooga to Atlanta and, if possible, crush the army of General Joseph E. Johnston, while the Army of the Potomac was to proceed toward Richmond and capture or destroy the famous Army of Northern Virginia under Lee. The advance was begun May 4. The first battle in the east was on May 5, in the so-called Wilderness, just south of the Rapidan River. Neither side gained a decisive victory. Grant continued his movement by ordering a march around Lee's right flank, but was again confronted at Spottsylvania Court House by Lee's whole army and was defeated in his purpose to crush that force. Again taking up the movement about the enemy's right, he was compelled to give battle at the North Anna River, but was again defeated and for the third time made a circuitous march to the left about Lee's position. At Cold Harbor the two armies again met, and after probably the most stubborn contest of the whole war Grant withdrew and attempted by his usual method to advance towards Richmond. At

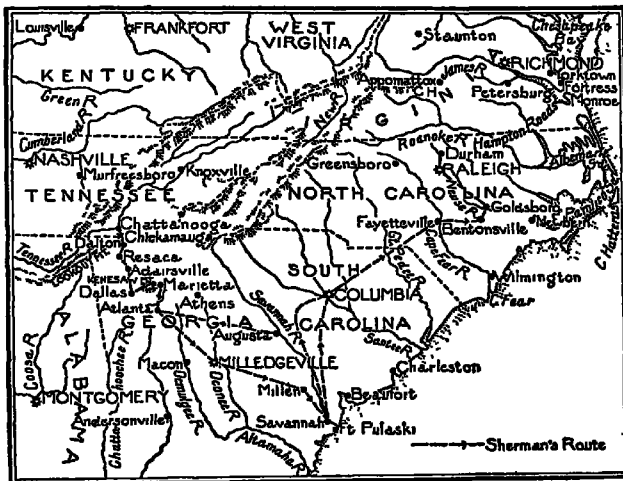
Petersburg he was brought to an abrupt halt and was compelled to begin a siege, lasting nearly a year.

Meantime, in the Shenandoah Valley, the Confederates under Early had threatened Washington and had made costly raids upon Northern towns, but in the summer of 1864 they were driven from the valley by Federal cavalry under Sheridan. During this summer General Sherman was carrying out his part of the general campaign, advancing

torious during this year, the *Alabama*, the most conspicuous of the Confederate privateers, being sunk by the United States corvette *Kearsarge*, in the harbor of Cherbourg, France. In Mobile Bay another daring feat had been placed to the credit of the American Navy, Rear Admiral Farragut being the hero of the occasion.

Last Months of the War. The successes of the Union arms during 1864 were to culminate in the early spring in the complete defeat of the Confederate

cause. General Sherman left Savannah February 1, marched with almost no opposition through the Carolinas and was soon ready to cooperate with Grant in the final campaign of the war. During the winter, though the Union army had gained little in its conquest of Virginia, the siege which the Confederates had endured at Richmond and Petersburg had reduced their power of resistance, and Lee determined to evacuate both places, attempt to join Johnston's army, which had made a faint protest against Sherman's advance, and flee to



SHERMAN'S MARCHES

slowly but steadily toward the important city of Atlanta against a brilliant resistance by General Joseph Johnston. Johnston was superseded, however, just as Sherman's campaign was drawing to a close, by General Hood. He was unable to stop the advance, and Sherman entered Atlanta, September 2. It was two months later that he left Atlanta and began his march to the sea, during which he destroyed everything of value in a strip sixty miles wide. He occupied the city of Savannah on Christmas Day. Meantime, General Hood had hoped to draw him from this operation by making a counter movement toward the north. Sherman dispatched Thomas to defend the State of Tennessee, and he did it admirably. Occupying Nashville, he awaited the approach of the Confederate force until December 15, when he opened a battle which resulted in the complete destruction of the Confederate army, the 15,000 survivors never being reorganized. On the sea the Union cause was also vic-

torious during this year, the contest could be continued indefinitely. The attempts of the Confederates to cut their way out of Petersburg, however, resulted in serious losses, and when the evacuation finally took place it was under such difficult conditions that Lee soon found himself confronted with the necessity of surrendering. This took place at Appomattox Court House, April 9, 1865. The wild rejoicing which this news caused at the North was suddenly hushed on the following Friday, April 14, by the assassination of President Lincoln, who, because of his unflinching common sense and high purposes, had become the central figure of the whole struggle. On April 21 Johnston surrendered to Sherman after a week of negotiation, and by May 26 all the forces of the Confederacy had laid down their arms. On May 10 President Jefferson Davis was captured and was sent a prisoner to Fortress Monroe.

Results. The war had lasted four years; it had commanded the services, all told, of

more than four million men three-fourths of whom were in the armies of the North. Nine of every ten men in the South, and four of every nine in the North, had served in the armies for an average of three years; 110,000 Union soldiers were killed in battle or died from wounds, while 250,000 others died from disease, exposure or other causes. The South lost 94,000 men in battle, and nearly 200,000 others died in the service. Thus, in both armies, an average of 700 men died each day from the beginning of the war to the end. The war cost the United States government in money fully three and a half billion dollars; it cost the Confederacy fully two billion dollars. In addition to these sums the United States government has paid out to Union soldiers more than three billion dollars in pensions. The total cost to both sections, excluding the terrible destruction of property and the loss caused by the check to production, doubtless amounted to at least nine billion dollars; this was an amount quite beyond precedent thus far in the world's history.

The greatest result of the whole contest was the abolition of slavery, which had been a constant source of weakness and dissension for a century. It made possible a real unity of all sections by removing the most conspicuous differences in their modes of life and thought. From the constitutional standpoint it decided that the United States was to be an "indestructible union of indestructible states."

Related Articles. Consult the following titles for additional information:

HISTORY AND POLITICS

Abolitionists	Hampton Roads Conference
Alabama, The	Kansas-Nebraska Bill
Andersonville	Mason and Dixon's Line
Appomattox Court House	Millard Compromise
Carpetbaggers	Nullification
Compromise of 1850	Reconstruction
Confederate States of America	Secession
Crittenden Compromise	Slavery
Dred Scott Decision	States' Rights
Emancipation Proclamation	Tariff
Fugitive Slave Laws	Trent Affair
	Underground Railroad

BATTLES

Antietam	Fredericksburg
Bell's Bluff	Gettysburg
Bull Run	Kenesaw Mountain
Cedar Creek	Malvern Hill
Cedar Mountain	Mechanicsville
Chancellorsville	Mobile Bay
Chattanooga	Monitor and Merrimack
Chickamauga	Murfreesboro
Cold Harbor	Nashville
Fair Oaks	Petersburg, Siege of
Five Forks	Shiloh
Fort Sumter	Spottsylvania Court House
Fort Henry and Fort Donelson	Wilderness

LEADERS

Bragg, Braxton	Lincoln, Abraham
Burnside, Ambrose E	Longstreet, James
Butler, Benjamin F	McClellan, George B
Davis, Jefferson	Meade, George G
Early, Jubal A	Pemberton, John C
Farragut, David G	Porter, David D
Foot, Andrew H	Rosecrans, William S
Grant, Ulysses S	Semmes, Raphael
Hood, John B	Sheridan, Philip
Hooker, Joseph	Sherman, William T
Jackson, Thomas J	Thomas, George H
Johnston, Albert S	Wilkes, Charles
Johnston, Joseph E	Winslow, John A
Lee, Robert E	

CLAIBORNE'S REBELLION, a dispute arising in the colonial history of Virginia and Maryland, in which the central figure was William C. Claiborne (1589-1676). He settled the Isle of Kent in Chesapeake Bay in 1631, established a trading post, and induced many colonists to join him there. As soon as Lord Baltimore was well established in Maryland he claimed Kent as a part of his colony, over the protest of Claiborne, who claimed it as his own, with Virginia more entitled to ownership than Maryland, for Kent had representation in the Virginia assembly. Virginia stoutly supported Claiborne. For years the dispute continued, with occasional loss of life and property; Claiborne was kept from the island by Baltimore's colonists. The ownership of the land in dispute was not settled until 1776, when Virginia withdrew its claim.

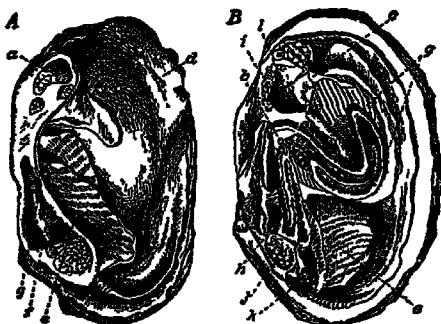
CLAMS, COURT OF. See **COURT OF CLAIMS**

CLAIRVOYANCE, *clair voyans*, the alleged power of persons who claim to possess the gift of seeing into the future and thus being able to foretell coming events. People who practice this supposed art are called *clairvoyants*; they are ready to give advice on every conceivable subject—investment, speculation, courtship, marriage, lost articles—and ask their credulous patrons to believe that their information comes from beyond the range of human vision. Without hesitation they will advise a man how to acquire wealth, while unable to accumulate it for themselves.

A crusade against clairvoyants in most cities has greatly reduced their number. They are subject to arrest and prosecution everywhere.

CLAM, a shell-fish, of which the salt water variety is a food delicacy. It is one of the mollusca (see **MOLLUSK**), and there are a number of species. In America the name is applied to two species, the hard shell, or *quahog*, and the long, or soft, clam. The

quahog has a nearly globular shell and lives on sandy bottoms, on which it stands erect on its thin edge. It is found from Cape Cod south, in water from fifteen to forty feet deep, and in city markets it is generally known as the *clam*. The young are known as *little necks*; these are the most highly prized of all the clam foods.



THE CLAM

- | | |
|---|--|
| A—Right valve of Shell, to show internal organs | B—Dissection |
| a Anterior muscle for closing shell. | e Intestine. |
| b Opening of reproductive organ | f Kidney |
| c Brain. | g Liver |
| d Foot | h Rear muscle for closing shell. |
| e Gill | i Space through which water passes in leaving shell. |
| f Heart. | k Stomach. |

Soft clams have a thin, smooth, somewhat oval shell and possess siphons that are often longer than the shell itself. These clams burrow in the sand above low water mark to such a depth that only the tips of their siphons protrude. When disturbed they emit a spurt of water from the siphon and withdraw from sight. They are obtained by digging them from the sands at low tide, and in many places they are found in large numbers. They are highly prized for food, and under favorable conditions are often cultivated. The term *clam* is also applied to fresh water mussels (see *MUSSEL*). The shell of the quahog was used as money by the Indians who formerly inhabited the New England states (see *WAMPUM*).

CLAN, the name given to an indefinite social institution which has existed in almost every stage of civilization, both in Eastern and Western countries. It signifies a group of families claiming descent from common ancestors and united under one leader. The most common principle upon which the clan

was organized was the obligation of all members to avenge one another's injuries. The most familiar form of clanship was furnished by the Highlanders of Scotland. Among them the name of the clan was frequently formed from that of the original ancestor, with the prefix *mac*, meaning *son*; thus the MacDonalds were the sons of Donald, and every individual of that name was considered a descendant of the founder of the clan and a brother of every one of its members. The chief exercised his authority by right of inheritance as the father of his clan. The clansmen revered and served the chief with the blind devotion of children. Each clan occupied a certain portion of the country, and hostilities with neighboring clans were frequent.

CLARENDON, EDWARD HYDE, Earl of (1608-1674), chancellor of England. He began his political career in 1640 as a member of the Short Parliament, and he was later in the same year returned to the Long Parliament. At first he acted with the more moderate of the popular party, but gradually separated himself from the democratic movement until, by the autumn of 1641, he was recognized as the leader of the king's party in the House. Upon the breaking out of the Civil War he joined the king, and was his valued aid until the latter's execution.

In September, 1649, he joined Prince Charles at The Hague. After Cromwell's death Clarendon did more than any other man to promote the restoration of Charles, who as a reward made him lord chancellor. The marriage of the duke of York with his daughter, Anne Hyde, confirmed for a time his power, but by 1663 his influence with the king began to decline, and his station as prime minister made the nation regard him as answerable for the ill success of the war against Holland and for the sale of Dunkirk. In 1668 the king deprived him of his offices, an impeachment for high treason was commenced against him and he was compelled to seek refuge in Calais.

CLARET, *blanc et*, a name generally applied to any red table wine, but more properly applied to Bordeaux wines. The term was first used in England, and it never became current in France.

CLARINET, or **CLARINET**, a wind instrument of the reed order, regulated by the fingers on eighteen holes, thirteen of them having keys, the tone being produced by

the vibration of a thin reed in the mouth-piece. Its lowest note is E below the F clef, from which it is capable, in the hands of good performers, of ascending more than three octaves. A clarinet can be played in only one key, therefore different clarinets are attuned to different keys, B flat, A flat and E flat being those most commonly used. The instrument was invented as early as the year 1690.

CLARK, CHAMP [**JAMES BEAUCHAMP**] (1850-1921), an American lawyer and Democratic politician, born in Anderson County, Ky., and educated in the common schools and at Kentucky University, Bethany College and the Cincinnati Law School. At different times he was employed as farm laborer, clerk, editor, lawyer and later became president of Marshall College in West Virginia. He removed to Missouri, and in 1889 was elected a member of the House of Representatives. From that date he has served continuously in that body, except for two terms, from 1891 to 1893, and from 1895 to 1897. In 1911 he was elected Speaker of the House of Representatives, succeeding "Uncle Joe" Cannon, when the Republicans lost control of that body, and in the following year was an unsuccessful candidate for the Democratic nomination for President, being defeated by Woodrow Wilson, but not until the forty-sixth ballot. He was reelected Speaker in 1913, 1915 and 1917. When the Democrats lost control of the House of Representatives in the elections of 1918 Clark was succeeded in the Speakership in 1919 by a Republican.



CHAMP CLARK

CLARK, FRANCIS EDWARD (1851-1925), the founder of the United Society of Christian Endeavor, which grew from a small group in a single church until it reached around the world and embraced millions in its membership (see **CHRISTIAN ENDEAVOR, UNITED SOCIETY OF**). Clark was born in Aylmer, Ont., and was graduated at Dartmouth College and at Andover Theological Seminary. He held Congregational pastorates at Portland, Me., where the first Christian Endeavor group was organized,

from 1876 to 1881, and in Boston, from 1883 to 1887.

He made five trips around the world in the interests of the Christian Endeavor work; became editor of *The Golden Rule*, the organ of the Society, and wrote more than a score of books.

CLARK, GEORGE ROGERS (1752-1818), an American pioneer, of invaluable service to his country for more than a generation. He began life as a land surveyor. In 1776 he moved to Kentucky and soon became the leader of the frontiersmen. He was largely instrumental in securing the organization of Kentucky as a separate county. In 1777, then a major, Clark obtained means from Virginia to attack the fort at Kaskaskia, which he captured in the following year. To revenge an invasion of Kentucky by Canadians and Indians, he destroyed an Indian town in Ohio in 1780. In the same year he went to Richmond to obtain approval from the authorities for his plans for the capture of Detroit, and while there took a command under Baron Steuben to defend Virginia against an invasion by a British force. In 1782 he marched against Indian towns on the Miami and Scioto rivers, and destroyed five. Later, under French commission, he headed an expedition against the power of Spain on the Mississippi River. In his later years he was in poverty, but Virginia presented him with an estate in what is now the state of Indiana.

CLARK, WILLIAM (1770-1838), an American explorer, who with Meriwether Lewis revealed knowledge to the world regarding the vast wilderness in 1804-1805 between the Mississippi River and the Pacific Ocean (see **LEWIS AND CLARK EXPEDITION**). He was born in Virginia, but was taken by his parents to Louisville, Ky., in 1784. He served in Indian campaigns with Wayne, but resigned from military life in 1796. In 1803 he again entered the army as second-lieutenant, and in the following year was placed in joint command with Lewis of the expedition for exploration of the Northwest. Upon his return he was made brigadier-general of militia, was governor of Missouri territory from 1813 to 1821, and from the following year until his death was superintendent of Indian affairs, with headquarters at Saint Louis.

OLARKSBURG, W. VA., founded in 1785 and named for George Rogers Clark, is the

county seat of Harrison County, ninety-seven miles southeast of Wheeling, on the Baltimore & Ohio Railroad. Tributary to the city are ninety coal mines, and there is an abundant supply of natural gas. Population, 1920, 27,869; in 1930, 28,866, a gain of 3.6 per cent.

CLARK UNIVERSITY, an institution for postgraduate study, at Worcester, Mass., founded in 1887 by James Gilman Clark. Its special object is to afford educators and specialists the best opportunities for research along the lines in which they are interested. In accordance with the terms of a bequest by Mr. Clark, a collegiate department was organized in 1902, to be conducted upon the same general plan as that of the postgraduate department. The University publishes the *American Journal of Psychology* and the *Pedagogical Seminary*. Many important memoirs and monographs have also been published by its students and graduates. There are about forty instructors and 300 students, and the library contains 95,000 volumes.

CLASSIFICATION, in botany and zoölogy, the system of arranging plants and animals into groups according to similarities of structure. The principal divisions are explained in detail under the headings **FAMILY, GENUS, ORDER, SPECIES, VARIETY**.

CLAUDIUS, (10 B C-A. D. 54), a Roman emperor, whose full name was **TIBERIUS CLAUDIUS DRUSUS NERO GERMANICUS**. He was the son of Claudius Drusus Nero, stepson of Augustus. He lived in privacy, spending his time in writing and studying, until the murder of Caligula, when he was dragged from his hiding place and proclaimed emperor (A. D. 41). His reign was marked by the embellishment of Rome and by successes in Germany and Britain. Later he became debauched and left the government largely to his infamous wife, Messalina, who with his freedmen committed the greatest enormities. He was poisoned by his fourth wife, Agrippina, the mother of Nero.

CLAXTON, PHILANDER PRIESTLEY (1862-), an American educator, born in Bedford County, Tenn. He received his degree from the University of Tennessee and did postgraduate work at Johns Hopkins University and in Germany. After serving successively as superintendent of schools at Kinston, Wilson and Asheville, N. C., he

became in 1893 professor of pedagogy in the North Carolina State Normal and Industrial College. In 1902 he became professor of education in the University of Tennessee, then for five years was United States Commissioner of Education. Afterward he went to the University of Alabama, to Tulsa (Okla.) as city superintendent of schools, and in 1930 to Clarksville, Tenn., normal school, as president.

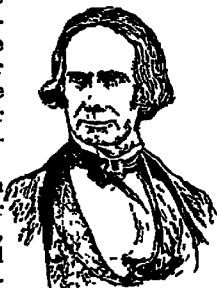
CLAY, the name given to various earths, the most familiar variety being that used for making bricks and tile. But there are other and rarer varieties of great value, which many people do not identify as clay. Clay consists of silicate of aluminum, with small proportions of the silicate of iron, calcium, magnesium, potassium and sodium. All the varieties are characterized by being weighty, compact and hard when dry, but plastic when moist; smooth to touch; not readily diffusible in water, but when mixed, not readily settling in it. Their tenacity and ductility when moist and their hardness when dry have made clays from the earliest times the materials of bricks, tiles and pottery.

One of the rarest of the clays is *kaolin* (which see), a white clay with occasional gray and yellow tones; this is the purest. *Porcelain clay* is one of the best varieties. *Potter's clay* and *pipe clay*, which are similar but less pure, are generally of a yellowish or grayish color, from the presence of iron. Fire clay is a very refractory variety, always found lying immediately below the coal; it is used for making fire bricks and crucibles and for lining furnaces used in smelting iron and some other metals. *Loom* consists of clay mixed with sand, oxide of iron and various other foreign ingredients. Other varieties are *fullers' earth* (which see), *Tripoli* and *boulder clay*, the last a hard clay of a dark brown color, with rounded masses of rock of all sizes embedded in it, the result of glacial action.

The distinctive property of clays as ingredients of the soil is their power of absorbing ammonia and other gases and vapor generated on fertile and manured lands; indeed, no soil will long remain fertile unless it has a fair proportion of clay in its composition.

CLAY, HENRY (1777-1852), one of the greatest of American statesmen, who was named the "Great Pacificator" because of his sincere effort to avert war in the United

States over the slavery question His unalterable views so influenced his career that he failed to attain the Presidency; he realized at last that the honor would never come to him, but he said, "I would rather be right than be President"



HENRY CLAY

Clay was born in Ashland, Hanover County, Va., April 12, 1777. He received practically no education, but was able to begin the study of law and opened his first office at Lexington, Ky., in 1797. He soon became famous as a jury advocate and public speaker, and at the age of twenty-six was a member of the Kentucky legislature. In 1806-1807 and 1810-1811 he filled unexpired terms in the United States Senate although not having attained legal age to qualify as a Senator at the date of his first appointment. In 1811 he was chosen to the House of Representatives, where he was at once made speaker. Here he became prominent as an advocate of war and from his official position practically forced the War of 1812 upon the country. He acted as one of the American commissioners in the peace negotiations in 1814.

Clay was continuously reelected Speaker of the House until his retirement in 1821. Again he occupied that post when reelected to Congress in 1823. During his career in the House his most important act was doubtless the introduction of the famous Missouri Compromise of 1820 (see MISSOURI COMPROMISE). In 1824 he was an unsuccessful candidate for the Presidency against Crawford, Jackson and John Quincy Adams. No candidate had a majority of the electoral vote, and the contest was therefore sent to the House of Representatives, where Clay, being fourth in the list, was ineligible for election. He transferred his strength to Adams, and upon the latter's election Clay was appointed Secretary of State. This fact gave the basis for the charge of corruption between Adams and Clay, which, though unfounded, was used to the latter's political injury throughout his career. As chief of Adams' Cabinet he displayed considerable

ability, but he lost his prestige in Congress through absence, and never regained it.

Clay was again elected to the Senate in 1831, became a bitter opponent of President Jackson, and was his competitor in the election of 1832, but was defeated. He again became conspicuous as pacificator in the nullification controversy of 1833, when, by his compromise tariff measure, he probably prevented a resort to arms. Throughout the rest of his career, Clay was one of the foremost orators in America, and though unsuccessful in his great ambition to become President, he was an acknowledged leader of the Whig party. He retired from the Senate in 1842, was defeated for President by Polk in 1844 and was defeated for the nomination by Taylor in 1848, but in the same year he was reelected to the Senate. From this time forward he devoted his efforts to allaying the sectional strife upon the slavery question, and he made his last great speech in the Senate in support of the Compromise of 1850. Though a man of strong convictions, Clay often sacrificed popular favor by seeking to win the support of all sections and factions, and thus gained the reputation of being vacillating and even insincere.

CLAYTON-BULWER TREATY, a treaty between Great Britain and the United States, concluded in 1850, by which both parties agreed to guarantee the neutrality of a canal through Central America, but not to exercise any control over the territory nor to erect any fortifications there. It was at this time that the Nicaragua Canal was proposed (see NICARAGUA CANAL). The United States made several attempts to have this treaty modified or abrogated, but the British government refused to concur, until 1901, when the Clayton-Bulwer Treaty was abrogated (see HAY-PAUNCEFOTE TREATY). The negotiators were Secretary of State John M. Clayton, for the United States, and Sir Henry Bulwer, special ambassador, for Great Britain.

CLEARING HOUSE, a term which has become almost exclusively associated with the management of banks in large cities, but which, in a broad sense, means a place where the claims of several parties, regardless of the nature of their business, are adjusted.

In connection with the banking business the methods employed in a clearing house amply justify the title. In it all debts and

credits of the various member banks are "cleared" every day with minimum effort and slight expenditure of time.

How It is Conducted. Each member bank sends to a central office, which they call the clearing house, two representatives—a so-called delivery clerk and a settling clerk. In a large room each bank is assigned a desk. Upon arrival at the clearing house, usually about 11 A. M., the clerks from each bank deposit at the manager's table a ticket showing the aggregate amount due to them from other banks, as shown by checks which these clerks have brought with them. The manager enters this sum to the credit of the bank presenting the ticket. The checks which each set of clerks have brought with them are divided into bundles, each of which contain checks upon some other one bank. At a given signal the settling clerks seat themselves at their respective desks and the delivery clerks pass among them, delivering to each settling clerk bundles of checks drawn on the bank which he represents. When each settling clerk has received all the bundles of checks drawn against his bank he draws up a statement of the demands made upon him. The lists of all the settling clerks are then sent to the manager, who draws up a statement showing the amount which each bank owes to each of the other banks in the association. The checks against the banks are then returned to the banks by their respective clerks; the separate items are approved, and the debtor banks must pay to the creditor banks the amounts due.

If the clearing house did not exist, each bank would have to send its messengers directly to all other banks to settle balances; the cost would be excessive, for many hours daily would be required. Time would not permit the use of the mails to make the daily clearings.

The clearings of banks in large cities reach enormous proportions, the totals varying widely between years of prosperity and years of business depression. New York, as the financial center of the country, may clear as much as a billion dollars in one day. The total bank clearings in the United States in a year have been as high as 715 billions, and average well over 400 billions.

CLEAVAGE, *klé'vaj*, the manner or direction in which crystallized substances regu-

larly split. The regular structure of most crystallized bodies becomes manifest as soon as they are broken. Each fragment presents the form of a small polyhedron, and the very dust appears under the microscope an assemblage of minute solids, formed according to some plan of crystallization. The directions in which such bodies thus break up are called their *planes of cleavage*. See CRYSTALLOGRAPHY; METAMORPHISM; STRATIFIED ROCKS.

CLEVELAND, MOSES (1754-1806), a soldier in Washington's army, then in 1796 appointed as director and surveyor of the Connecticut Land Company's Western Reserve project. He took 52 settlers west, and at the mouth of the Cuyahoga River found a favorable spot for the establishment of the principal settlement. The new town was named in his honor; it became Cleveland, Ohio, but not until about 1830 was the spelling of the name changed. See WESTERN RESERVE.

CLEMATIS, *klem'a tis*, a genus of woody, climbing plants. The most common species, virgin's bower or traveler's joy, is conspicuous in the hedges both of England and the south of Scotland, first by its copious clusters of white blossoms and afterward by its feather-tailed, silky tufts attached to the fruits. There are about one hundred species of clematis, most of which are found in temperate climates. In North America about twenty species grow well. The most common of these is the virgin's bower, which resembles the European clematis both in its color and in its feathery pistils. A rarer species, found in a few locations, has large, single, purplish drooping flowers.

CLEMENCEAU, *klé mah'n so'*, GEORGES BENJAMIN EUGENE (1841-1929), a French statesman and journalist of radical views, called the "Tiger" because of his dauntless courage and fighting powers. For nearly half a century a storm center of French politics, he dominated the situation at the most critical period of the World War, and by rescuing his country from pacifist and enemy intrigues proved himself the "strong man" of France. Clemenceau was educated to be a physician, and in the early part of his career he spent several years in the United States, teaching and practicing medicine. While in America he married an American woman. Returning to France shortly before the outbreak of the Franco-

German War, he was elected mayor of the district of Marte in Paris, and in 1876 was chosen a Republican Deputy in the French Parliament. In that body his independence of action and vigor of speech made him a prominent figure nationally, and his reputation was further enhanced by his radical editorials in *La Justice*, a daily paper which he founded in 1880.

Clemenceau lost his seat in the Chamber of Deputies in 1893, and for about ten years labored for justice and democracy with a trenchant pen. He was one of the strongest leaders in the movement in behalf of Captain Dreyfus, founding a new paper, *L'Aurore* ("The Dawn"), to champion the cause of that wronged officer. In 1902, at the age of sixty-one, he was elected to the national Senate, from the department of Var, in 1906 was appointed Minister of the Interior and in 1906 was made Premier of France. Though his Ministry was defeated in 1909, Clemenceau continued to be a power in politics, and in 1913 he was instrumental in overturning the Briand Ministry. He also became editor of a radical paper, *L'Homme Libre* ("The Free Man"), in which, during the World War, he unsparingly criticized the government for its vacillation and weakness.

In October, 1917, when the cause of the allies seemed in danger of disaster, Clemenceau was again called to head the Cabinet. Traitors were brought to trial, intrigues were crushed, and the nation's weakened morale was strengthened. The manner in which the people rallied and the army fought its way to victory in 1918 is told in these volumes in the article *WORLD WAR*.

It is a remarkable thing that Clemenceau should have been Premier of France when Germany surrendered. After the Franco-German War he had signed a manifesto against the cession of Alsace-Lorraine, and at the close of the World War he said, "The redemption of Alsace-Lorraine has been the goal of my life." At the peace conference which began sittings in January, 1919, the aged Premier was made chairman. In January, 1920, he was a passive candidate for the Presidency of France, but was defeated by Deschanel. Notwithstanding his great age he published in 1919 *The Strongest*, and in 1929, *In the Evening of My Thought*.

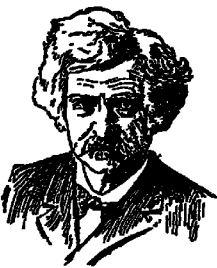
Clemenceau was not a Socialist, but he believed in radical social legislation and gov-

ernment ownership of monopolies. He represented that versatility characteristic of nearly all French intellectuals, and was not only a political leader but a novelist, dramatist, philosopher and essayist.



CLEMENS, *klem'enē*, SAMUEL LANGHORNE (1835-1910), best known as MARK TWAIN, was probably America's most beloved humorist. His writings have delighted old and young for a generation, and are continuing in their popularity. Clemens was born at Florida, a little hamlet in Northeastern Missouri, about fifty miles west of the Mississippi, November 30, 1835. His early education consisted of the limited training he could then get in this small country town and at thirteen years of age he entered a printing office. After becoming an expert compositor he worked for short periods of time in Saint Louis, Philadelphia, New York and other places. In 1851 he gave up his work in printing offices and went on a Mississippi steamboat as apprentice, where in 1857 he became a pilot. Here he met with a great variety of experiences which later he used to much advantage in writing the series of highly entertaining chapters, which now make his book *Life on the Mississippi*. Here, too, he must have originated his pen name, for "By the mark, twain" was the cry used by the man who sounded the depth of the water to tell the pilot that it was two fathoms deep. It is said that Captain Isaac Sellers had signed articles *Mark Twain* in the New Orleans *Picayune* previous to the time Clemens assumed the name, but it now belongs completely to the latter and thousands upon thousands of readers know the genial humorist by no other. When the Civil War broke out navigation on the Mississippi ceased and Mr. Clemens lost his occupation as pilot. For some little time he was a member of a company of Confederate sympathizers organized near his home, but he never was engaged in active war service. About this time his brother had been appointed Territorial Secretary of Nevada and Mr. Clemens went

out with him to Nevada, City, where for a time he was interested in mining. In 1862, however, he became a reporter for a Virginia City paper, and several years later he removed to California, where he was a reporter for the *Morning Call*. In 1866 he went to the Sandwich Islands, and upon his return began his career as lecturer, attracting considerable attention. The publication in 1867 of the *Jumping Frog of Calaveras County* increased his reputation, and *Innocents Abroad*, an account of an excursion through Egypt and the Holy Land, won him international



SAMUEL L. CLEMENS

fame. In 1870 he married, and after editing for two years the *Buffalo Express*, settled in Hartford, Conn. He joined a publishing firm of New York in 1884, but after a few years of success the firm became bankrupt, and Clemens, to meet his heavy losses, traveled as a lecturer, meeting with the greatest success. For some years after 1890 he lived in Europe.

Besides the works mentioned above, Clemens is noted chiefly for his *A Connecticut Yankee at King Arthur's Court*, *Pudd'n-head Wilson*, *The Prince and the Pauper*, the *Adventures of Tom Sawyer* and the *Adventures of Huckleberry Finn*. The last two, especially, are of their kind unrivaled, not only because they are full of Clemens's genial humor, but because they give truthful, vivid pictures of the free life of a boy along the Mississippi River.

CLEMENT, *klem'ent*, the name of fourteen Popes, of whom the following are of greatest importance:

Clement I, reputed to have been the third bishop of Rome after Peter, lived in the first century A. D. He was greatly venerated in his day, and a letter which he addressed to the Church of Corinth was at one time regarded as a part of the Bible.

Clement VII, a member of the Medici family, occupied the Papal chair from 1523 to 1534. He was the Pope who refused to recognize Henry VIII's divorce of Catharine of Aragon.

Clement VIII, a man of great piety and learning, was Pope from 1592 to 1605. He helped to bring about a reconciliation between France and Spain, and smoothed out the controversy between Henry IV of France and the Church.

Clement XIV, Pope from 1769 to 1774, founded the Clementine Museum in the Vatican. He was a zealous supporter of the Jesuits, but because of this attitude he aroused opposition in many countries. He was the last of the Popes to bear the name Clement.

CLEOPATRA, *klee o pa'tra* (68-31 B. C.), queen of Egypt, distinguished as **CLEOPATRA VI** from others who bore the name. She was one of the most famous rulers of all time—not because she was crowned with virtues that made her beloved of her people, or for great monuments to her genius or for strength of character which inspired the nation, for she is not known for any of these qualities. She was a queen of great personal attraction, but lacked the quality of wondrous beauty possessed by some famous women of history. Against her blandishments no man except Augustus was able to stand, she led the greatest according to her fancy. Pascal, who lived from 1623 to 1662, said of her, "If the nose of Cleopatra had been shorter, the whole face of the earth would have been changed."

When she was seventeen years old her father died, leaving her as joint heir to the throne with his eldest son, Ptolemy; when she was deprived of her part in the government she won Caesar to her cause and was reinstated by his influence. In a second disturbance Ptolemy lost his life, and Caesar proclaimed Cleopatra queen of Egypt, though she was compelled to take her brother, the younger Ptolemy, as colleague. Caesar continued some time at Cleopatra's court. By poisoning her brother, she became sole possessor of the regal power, took the part of the triumvirs in the civil war at Rome and after the Battle of Philippi went to do homage to Antony at Tarsus. Their meeting was celebrated by splendid festivities; she accompanied him to Tyre and was followed by him on her return to Egypt. After his conquest of Armenia he again returned to her. On the commencement of the war between Augustus and Antony, the latter lost a whole year in festivals and amusements with Cleopatra at Ephesus, Samos and Athens, and when at last the fleets met at Actium, Cleopatra suddenly took to flight, with all her ships, and Antony immediately followed her. Augustus advanced on Alexandria and proved himself proof against Cleopatra's remarkable fascinations. Believing Cleopatra to be dead, Antony threw himself on his sword, and shortly afterward

Cleopatra killed herself, by applying an asp to her arm, to escape the ignominy of being led in a Roman triumph. Such is the traditional account of her death.

Cleopatra bore a son to Caesar, who was called Caesarion. She bore three children to Antony. In A D 40 the Ptolemy line became extinct through the slaying of the last of Cleopatra's descendants by the Emperor Caligula.

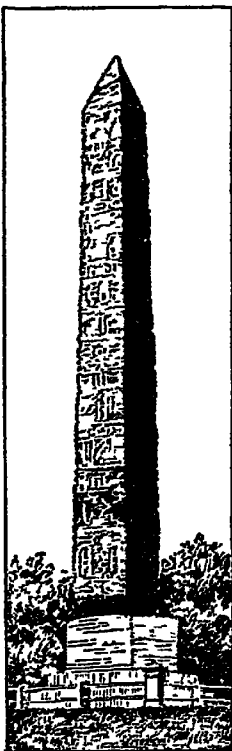
She has been given a romantic setting through the centuries, for writers and artists have found in her person and career abundant material with which to create an atmosphere of profound interest.

CLEOPATRA'S

NEEDLES, the name given to two Egyptian obelisks, formerly at Alexandria; one of them is now in New York, the other in London. They are made of rose-red granite and were originally erected by Thothmes III in Heliopolis, being dedicated to the god Ra, or the Sun. They were taken to Alexandria shortly before the commencement of the Christian Era and remained there until 1877, when they were presented to Great Britain and the United States by the Khedive Ismail Pasha.

The New York obelisk is sixty-nine feet high and weighs 200 tons. The sides are covered with inscriptions of Thothmes III and Ramesses II.

In the dry and hot air of Egypt the obelisks stood undamaged for 3,000 years, but in the atmosphere of New York and London they began to disintegrate. A preservative fortunately has been found to apply to the stone.



CLEOPATRA'S
NEEDLE
In Central Park
New York



CLEVELAND, STEPHEN GROVER (1837-1908), an American statesman and President, the only chief executive of the United States who has served two terms not in succession. His career as President was not always calm, he antagonized his own party on numerous occasions, and history has justified his course. After leaving office his strength with the people steadily increased, and at his death he was ranked as one of the greatest figures of his time.

Cleveland was born in Caldwell, N. J. The death of his father, a Presbyterian clergyman, compelled young Cleveland to earn his own living, and he became a clerk and assistant teacher in the New York institution for the blind. In 1855 he started west, but stopped at Buffalo, where he was admitted to the bar in 1859. In 1863 he became assistant district attorney of Erie County, and he was made sheriff in 1870. In 1881 he was elected mayor of Buffalo on the Democratic ticket, though the city was strongly Republican, and his efficient administration led to his nomination and election as governor of the state by a remarkable plurality. His career as governor was marked by exceptional ability, fearlessness and honesty. He was nominated for President at the national Democratic convention held in Chicago in 1884, and was elected over Blaine, Republican, by a small plurality.



GROVER CLEVELAND

As President he made extraordinary use of the veto power to curb unworthy legislation, especially private pension bills, and boldly advocated a reduction in the tariff. In 1888 he was again Democratic candidate for President, but he was defeated by the Republican candidate, Benjamin Harrison. He then removed to New York and practiced law. On June 2, 1886, he had married, at the White

First Administration of Grover Cleveland

I. THE PRESIDENT

- (1) Birth
- (2) Parentage
- (3) Education
- (4) Public career
- (5) Character
- (6) Death

II. GOVERNMENTAL AFFAIRS

- (1) Important laws
 - (a) Contract labor law
 - (b) Act in regard to the Presidential succession, 1886
 - (c) New Anti-polygamy Act
 - (d) Chinese Exclusion Act
 - (e) Rivers and Harbors Bill
 - (f) Interstate Commerce Act,
 - (1) Causes
 - (a) Granger movement
 - (b) Discrimination by railroads
 - (1) Rates
 - (2) Facilities
 - (c) Growing power of railroads over other industries
 - (2) Its provisions
 - (a) Forbade pooling
 - (b) Discrimination and rebates illegal
 - (c) Required publicity of rates
 - (d) Higher charge for short haul than for a long haul illegal
 - (e) Established commission to investigate and to punish offenders
 - (g) Electoral Count Act
 - (1) To avoid contested elections
 - (h) Repeal of the Tenure of Office Act
- (2) Other affairs
 - (a) The attempt to reduce the tariff
 - (1) Mills' Bill
 - (b) President's use of the veto

- (1) Vetoes more bills than any previous President

- (2) Mostly private pension bills

- (c) Department of Agriculture established

III. LOCAL AND INTERNAL AFFAIRS

- (1) Dedication of the Statue of Liberty
- (2) Organization of the American Federation of Labor
- (3) Deaths of many prominent men
 - (a) Grant
 - (b) McClellan
 - (c) Hancock
 - (d) Tilden
 - (e) Logan
 - (f) Sheridan
 - (g) Conkling
 - (h) Arthur
- (4) Haymarket Riot, 1886
- (5) Charleston Earthquake, 1886

IV. ELECTION OF 1888

- (1) Candidates
- (2) Tariff the issue

Questions

- Where was Grover Cleveland born?
 How old was he when he became President?
 What public offices had he held?
 What was the Contract Labor Law?
 When was the act regarding the succession to the presidency passed?
 Who stands next in order to the Vice-President?
 What were the provisions of the new Anti-polygamy Act?
 What were some of the causes of the Interstate Commerce Act?
 What did the law provide?
 What was decided by the Electoral Count Act?
 What executive department was established during this administration?
 What great statue was dedicated in 1886?
 What great labor organization was founded in 1887?

Second Administration of Grover Cleveland

I. THE PANIC OF 1893

- (1) Causes
 - (a) Agricultural depression
 - (b) Reckless financing
 - (c) Speculation in Argentine securities
 - (d) Financial crisis in Europe
- (2) Incidents
 - (a) Currency at a premium
 - (b) Clearing House Certificates issued
 - (c) Bank and commercial failures
 - (d) 22,000 miles of railway in hands of receivers
- (3) Results
 - (a) Industrial chaos
 - (1) Depression and inactivity in business
 - (2) Strikes and lock-outs
 - (a) Caused by reduction of wages or no work
 - (1) Caused by closing of the Pullman shops
 - (2) Rioting and destruction of property
 - (3) Governor Altgeld of Illinois refused to call out militia
 - (4) President Cleveland sends Federal troops to protect the mails
 - (b) Repeal of the Silver Purchase Act
 - (c) Sale of gold bonds

II. GOVERNMENTAL AFFAIRS

- (1) Domestic
 - (a) Wilson-Gorman Tariff Act
 - (1) Originally a Democratic measure
 - (2) Changed in the Senate

- (3) Allowed to become law without the President's signature

- (b) Income Tax
- (c) Admission of Utah, 1896
- (d) Extension of Civil Service
- (2) Foreign
 - (a) Hawaii

- (1) President withdrew treaty of annexation from Senate
- (2) Appointed special commissioner to investigate

- (b) Bering Sea controversy settled

- (c) Treaty with China
 - (1) Beginning of the "open-door" policy

- (2) Integrity of China guaranteed

- (d) President acts as arbitrator
 - (1) Between Brazil and Argentine Republic
 - (2) Colombia and Italy
 - (3) Brazil and Italy
- (e) Venezuela dispute

III. LOCAL AND INTERNAL AFFAIRS

- (1) World's Columbian Exposition
- (2) Colorado grants suffrage to women

IV. ELECTION OF 1896

- (1) Candidates
- (2) Issues
- (3) Result

Questions

What were the causes of the great railway strike?

On what grounds did the President send Federal troops to Chicago?

Explain why the panic necessitated the repeal of the Silver Purchase Act.

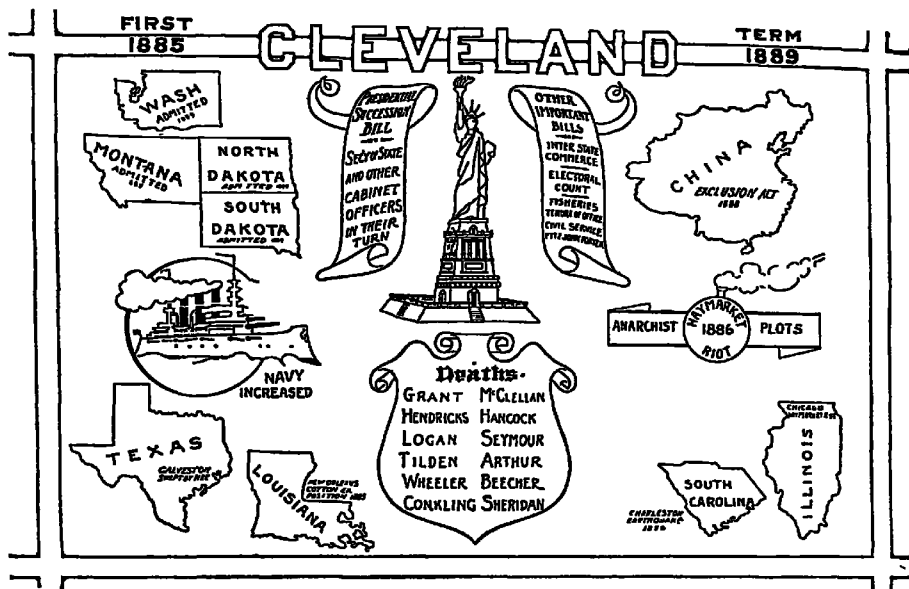
What is an income tax?

What state was admitted in 1896?

When was the Bering Sea controversy settled?

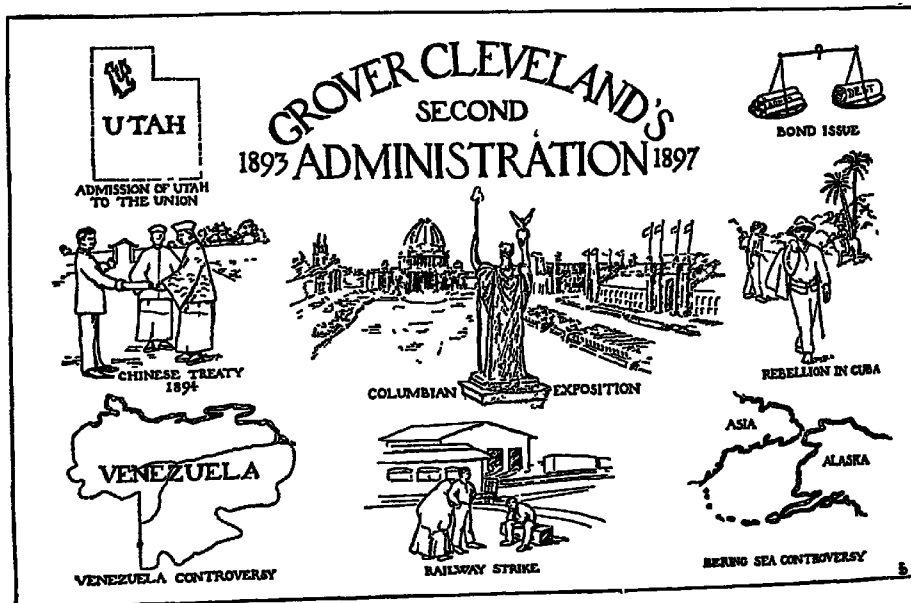
What was the President's attitude toward the annexation of Hawaii?

What event did it commemorate?



House, Miss Frances Folsom, daughter of his former law partner. He was again nominated by his party for President in 1892, in spite of opposition from his own state, and was elected. His second term was memorable because of a financial panic, which he strove

to avert by the repeal of the Sherman silver purchase law and by the issue of government bonds for the replenishment of the treasury's gold reserve; for the passage of the Wilson tariff law, which, though reducing some duties, was deemed so ineffectual by the



President that he would not sign it, and for the notable message from the President to Congress, in accordance with which steps were taken to compel England to arbitrate her controversy with Venezuela.

After his retirement from the Presidency, Mr. Cleveland did not reënter public life. When insurance scandals were disclosed in New York state Cleveland was called as a trustee for vast insurance interests, and his acceptance of the trust created a feeling of confidence that was a splendid tribute to him. He delivered each year a series of lectures in Princeton University, was elected a trustee of the University soon after his retirement from the Presidency, and took an active interest in its affairs. The tower of the new graduate school of Princeton is called the Cleveland Memorial Tower, in his honor.

Mrs Cleveland, the former White House bride, was married in 1913 to Professor Thomas J. Preston, Jr, of Princeton University.



CLEVELAND, *kleev'land*, Ohio, the county seat of Cuyahoga County, and second largest port of the Great Lakes, is situated on Lake Erie at the mouth of the Cuyahoga River, 183 miles southwest of Buffalo, 263 miles northeast of Cincinnati and 357 miles southeast of Chicago. Cleveland is the metropolis of Ohio and the sixth largest city of the United States, with a population of 560,663 in 1910. In 1920 it was 796,836; in

1930, 900,429.

General Description The city is built upon slightly rising ground which is 689 feet above sea level, and extends along the lake front for a distance of twelve miles, its greatest extent inland is about six miles, and its area is 73 square miles. The Cuyahoga River divides the city into two unequal parts, the eastern and the western, the latter and smaller of which is known as West Cleveland. This stream flows through a deep and somewhat broad valley, whose surface is considerably below the remaining portions of the city, and this valley is occupied by freight depots, factories and lumber yards.

The Cuyahoga River and valley are crossed by two noted bridges, the Lorain Central Viaduct, and the Detroit-Superior High Level Bridge. The streets are broad and well paved, and many of them are shaded with maples and elms, which add to the beauty of the city and have given it the name *Forest City*. From the Public Square the streets extend in all directions, but the longest thoroughfares in the lower part of the city are parallel to the lake shore, while farther inland they are nearly east and west. Crossing these are streets extending from the lake to the southern portion of the city. In nearly all sections the streets cross at right angles.

Parks and Boulevards. Of the many beautiful streets of the city, the finest is Euclid Avenue, a boulevard extending eastward from the Public Square. It is from eighty-three to ninety feet in width, and is lined with beautiful homes surrounded by spacious lawns. Of late years the lower part of this boulevard has been rendered less attractive by the encroachment of the business section. Other attractive thoroughfares include Lake Shore, East and Clifton boulevards, Magnolia Drive, Bellflower Road and Jumper Drive. The total park area of Cleveland is over 2,670 acres. Rockefeller Park, of 273 acres, is a long, narrow stretch of green connecting Wade and Gordon parks, the former overlooking the lake, and the latter situated at the mouth of Doan Brook, which flows into the lake. Rockefeller Park occupies the valley of the Doan, and was presented to the city by John D. Rockefeller. Brookside Park possesses a zoological garden, and Wade Park a splendid monument to Perry, hero of the battle of Lake Erie. Among other parks are Newberry, Forest City, Lincoln, Garfield and Woodland Hills.

Mention should be made of beautiful Lakeview Cemetery, notable as the burial place of President Garfield. His body lies in a crypt beneath a splendid memorial, worthy to be compared with the tomb of General Grant, in New York. This structure, 165 feet high, is of Ohio sandstone and contains in relief sculptures representing incidents in Garfield's life. The interior is in the form of a chapel decorated with symbolical friezes and containing a marble statue of Garfield in the center. The monument cost about \$130,000.

Public Buildings. The principal public edifices of Cleveland are grouped about a central plot of ground, in accordance with a "city beautiful" plan submitted by a commission which included Daniel H. Burnham. This group consists of the Federal building, courthouse, city hall, public library, public auditorium, all representing the finest ideals of modern architecture. At each end of the plot will be erected an imposing Court of Honor to connect the buildings. Cleveland is also noted for its many arcades, buildings erected about a central court with tiers of stores and offices having balcony fronts. Among other buildings of special note are the Chamber of Commerce, Art Museum, the Western Reserve Historical Society Building, the Terminal Tower building (52 stories) and the Union Trust building. There are nearly 410 churches, some of imposing architecture, and a number of handsome hotels.

Institutions. Cleveland was one of the first American cities to establish a free high school, and its public school system has kept pace with the development along other lines. There are besides, numerous private, parochial and business schools, and several colleges and universities. These latter include Western Reserve University (which see), with its departments of Adelbert College, Women's College and various professional schools; Case school of Applied Science, John Carroll University, the University School, and many professional schools. The public library has 350,000 volumes, and there are besides various college, law and historical libraries. In Severance Hall are held the concerts of the Cleveland Symphony Orchestra, a musical organization of national reputation.

Commerce and Industry. Among the Great Lakes ports Cleveland ranks next to Chicago in amount of freight tonnage entering and clearing its harbor, and it is also an important railway center, being served by the Cleveland, Cincinnati, Chicago & Saint Louis, the Baltimore & Ohio, the Erie, the New York Central, the New York, Chicago & Saint Louis, the Pennsylvania and the Wheeling & Lake Erie roads. The natural harbor at the mouth of the Cuyahoga has been improved by dredging operations and the construction of a huge breakwater, and a ship-channel 200 feet wide has been formed by the building of two parallel piers which extend out into the lake for a distance of

1,500 feet. The city has eighteen miles of river frontage and over five miles of docks. The Cleveland Municipal airport of 1,100 acres affords facilities for air mail and passenger transport to all parts of the country.

As a manufacturing center Cleveland ranks first in the state, third among the cities on the Great Lakes, and fifth among those of the entire country. The iron and steel industries have been especially developed because of the city's location between the coal, iron and oil regions of Western Pennsylvania and the Lake Superior iron and copper-ore districts. In the manufacture of steel ships, wire, bolts, nuts, machinery, etc., it is among the leading cities in the United States, and in the production of women's suits and coats it is surpassed only by New York. Cleveland is also one of the largest fresh-water fish markets in the country, and a center for the manufacture of automobile parts and accessories. Other important industries include slaughtering and meat packing, oil refining and the manufacture of electrical apparatus.

History. The first settlement on the site of Cleveland was made in 1796 by a party of surveyors under Moses Cleaveland, whose name was given to the new town, the present spelling being officially adopted in 1831. In 1809 Cleveland became the county seat of Trumbull County, which had been organized in 1800, but in 1814 it was incorporated as a town of Cuyahoga County, a subdivision of the original county. By 1820 the town had a population of 600, and boasted a bank and a newspaper. After the completion of the Ohio Canal the place grew rapidly, and in 1836 received a city charter. In 1921 the city manager form of government was adopted by Cleveland, but was discontinued in 1931 in favor of the mayor-council system.

CLICK BEETLE, SPRINGING BEETLE and **SKIP JACK**, names given to a family of beetles because of their peculiar behavior. If the click beetle is touched or alarmed, he folds up his legs and feigns death. If placed upon his back, he will lie quietly for a moment, and then by a sudden jerking motion, accompanied by a clicking sound, he will throw himself some little distance in the air, and, landing on his feet, will run away. There are about 500 species of click beetles in North America alone. The largest and most conspicuous is the *eyed elater*, which is grayish-black in color and has two

large black spots, like eyes, on the sides of its thorax. These beetles usually live singly in flowers, grass and decaying wood. The destructive larvae are known as *wireworms*. Some of the tropical click beetles are luminous, and one species carries two glowing spots on each side of its thorax. These beetles are sometimes worn as ornaments



CLIFF DWELLERS, one of the very earliest of American races, who left the evidences of their existence in the homes they built and inhabited in cliffs and rocks. They preceded the Pueblo Indians in the southwestern part of what is now the United States, in New Mexico and Arizona.

The cave dwellings were frequently built at the cost of great labor, and were closed and strengthened by stone walls, while their cliff houses were veritable fortresses, to which the inhabitants retreated when menaced by serious danger. Any situation pleased them, provided it gave hope of security. These dwellings have even been found hollowed in layers of volcanic ashes, hardened by time, while all around, pieces of cut silex and fragments of pottery attest the long sojourn of the people. One "cliff palace" had a length of 421 feet, contained 127 rooms, capable of affording shelter to 1,500 persons. The dwellings were constructed either of assorted stones, held together with moistened clay, or of adobe or sun-dried bricks. The circular ruins contain a number of small cells, and a building, often half-subterranean in the center, which the Spaniards called an *estufa*. Some contend that these *estufas* were the council chambers, where the principal men of the tribe assembled; while others hold that they were meant to keep the sacred fire, which is even to-day an object of veneration with the Indians. Sometimes the homes of the Cliff Dwellers were at a great altitude, being as high as 800 feet above the level of a river.

The entire San Juan valley is strewn with the ruins. There is one long, narrow structure running in front of a cave 200 feet wide at the mouth, where windows eighteen inches square are the only means of entrance

Recent explorations have brought to light a small number of mummies in a fair state of preservation. Side by side with the bodies, weapons, utensils and ornaments were found. Agriculture seems to have been more perfect among the inhabitants of Arizona than among those of New Mexico.

CLIMATE, the average condition of the atmosphere, with respect to temperature, humidity, rainfall, wind and storms. Weather is the atmospheric condition for a short period of time, as a day or a week, but climate is the condition of weather for a long period of years. Weather is constantly changing; but there have been no marked changes of climate for many centuries.

The chief determining factors of climate are latitude, altitude, the inclination of the earth's axis to the plane of its orbit, distance from the sea and prevailing winds. Of all these, latitude is the most important factor, since upon it, more than upon any other cause, depends the temperature of a region, which is the most important climatic feature. The temperature is the highest in the equatorial regions and gradually diminishes toward the poles. Were the surface of the earth perfectly smooth, there would be little or no variation in temperature for places having the same latitude, but the general effect produced by the different angles at which the sun's rays strike the earth between the equator and the poles is modified by numerous local conditions. Chief among these is altitude, and thus, next to latitude, is the most important agency that affects climate. The average temperature of a place falls one degree for every 300 feet in ascent above sea level. In other words, 300 feet in altitude will produce the same variation in temperature as from thirty to sixty miles in latitude, according to the location of the place. Hence in the mountainous regions of the tropics are all grades of climate from that of the torrid zone to that of the arctic regions.

Water is a great equalizer of temperature. It warms and cools much more slowly than the land. Hence, regions located in the vicinity of large bodies of water, such as those on the sea coast or near the Great Lakes, have a more equable temperature than those situated far inland. Winds blowing over the oceans acquire the same temperature as the water. Hence in the temperate

regions countries situated on the western coasts of the continents usually have a warmer climate than those on the eastern coasts in the same latitude, since the general direction of the winds is westerly. This is seen very clearly in comparing the temperature of places having the same latitude on the eastern and western coasts of North America. In each instance the higher temperature on the western coast is due to the prevailing westerly winds which have been warmed by blowing a long distance over warm marine currents. A similar contrast exists between the eastern coast of North America and the western coast of Europe.

Mountain ranges influence rainfall and winds; hence, they are important factors in determining the climate of certain localities, as that of the Great Central Plain in North America. This region is situated between the Appalachian Mountains on the east and the Rocky Mountains on the west. The prevailing winds are from the north or the south; hence, all of the interior of North America is subject to sudden changes of temperature, since the north wind causes a fall and the south wind a rise in temperature. In Europe the comparatively low western coast allows the warm winds from the Atlantic to blow over a large area, hence, that portion of the continent, though far north, has a comparatively warm climate. The Alps form a barrier which prevents these winds from blowing over the countries to the south, so that these countries are wholly under the influence of the warm winds blowing across the Mediterranean; hence, Spain and Italy have a warmer climate than portions of the United States in the same latitude.

Climate is the chief factor in determining the animal and vegetable life and the character of civilization of any locality. While the largest land animals and the most luxuriant vegetation are found in the tropics, it is within the temperate regions that the most intelligent and useful of the lower animals and the most valuable plants have developed. It is also within the north temperate region that the great nations of civilization have originated and reached their highest stage of enlightenment. See METEOROLOGY; WEATHER BUREAU.

CLINTON, DEWITT (1769-1828), a leading statesman of his time and one of the most famous of the governors of New York,

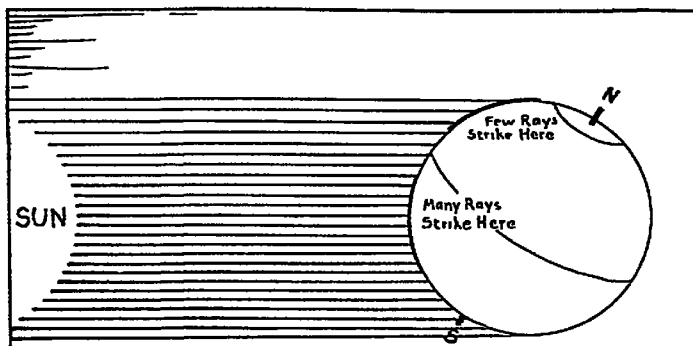
whose name is inseparably connected with the construction of the Erie Canal. He was born in Connecticut, but was educated for the law in New York and in that state he made his home. Clinton was admitted to the bar in 1788, in 1797 was elected to the legislature, the next year was a member of the senate of the state of New York and in 1801 was elected United States Senator. For twelve years, with two short intervals, he was mayor of New York. He was again member of the senate of New York from 1803 to 1811, and was lieutenant-governor of the state for two years. In 1812 he was defeated by Madison for President of the United States. In 1817 he was chosen governor of the state and was reelected three times. During his third term, in 1825, he officiated at the opening of the Erie Canal, thus witnessing the completion of a work to whose promotion he had devoted the best years of his life, and with which his name will be inseparably connected. See **ERIE CANAL**; **NEW YORK STATE BARGE CANAL**.



DEWITT CLINTON

CLINTON, GEORGE (1739-1812), an American soldier, statesman and Vice-President of the United States. He served in the last French and Indian war, in 1775 was a delegate to the Continental Congress and was appointed a brigadier-general in the Continental army in 1777. He was the first governor of the State of New York, serving from 1777 till 1795 with exceptional ability. Clinton was of great service to the colonial cause, through his influence over the Indians. He opposed the Federal Constitution on account of its centralization of power. He was again chosen governor in 1801, and three years later was elected Vice-President, which office he held until his death.

CLINTON, HENRY, Sir (about 1738-1795), a British major-general who arrived in Boston in 1775. He served at Bunker Hill, was second in command in the movements that compelled the Americans to evacuate New York in September, 1775, and was left in command of that city in the summer of

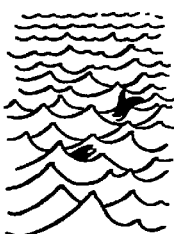


THE SUN AND THE EARTH IN DECEMBER

OTHER
TEMPERING
FACTORS



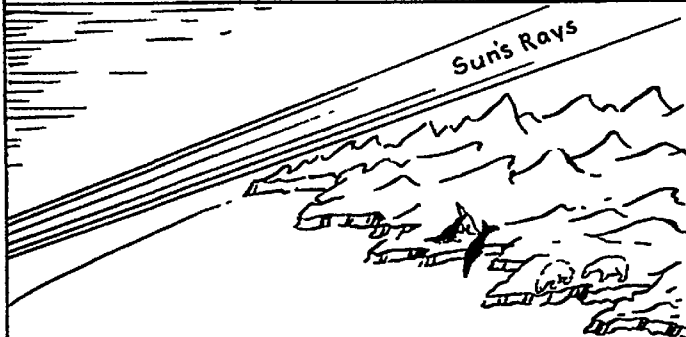
VARIATIONS
IN
ALTITUDE



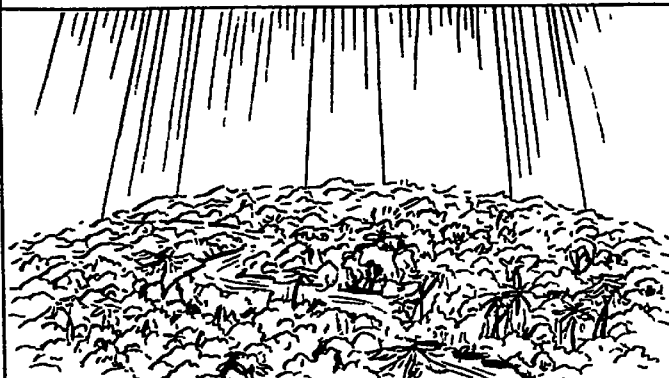
LARGE
EXPANSES
OF WATER-
OCEAN
CURRENTS



STRONG
PREVAILING
WINDS

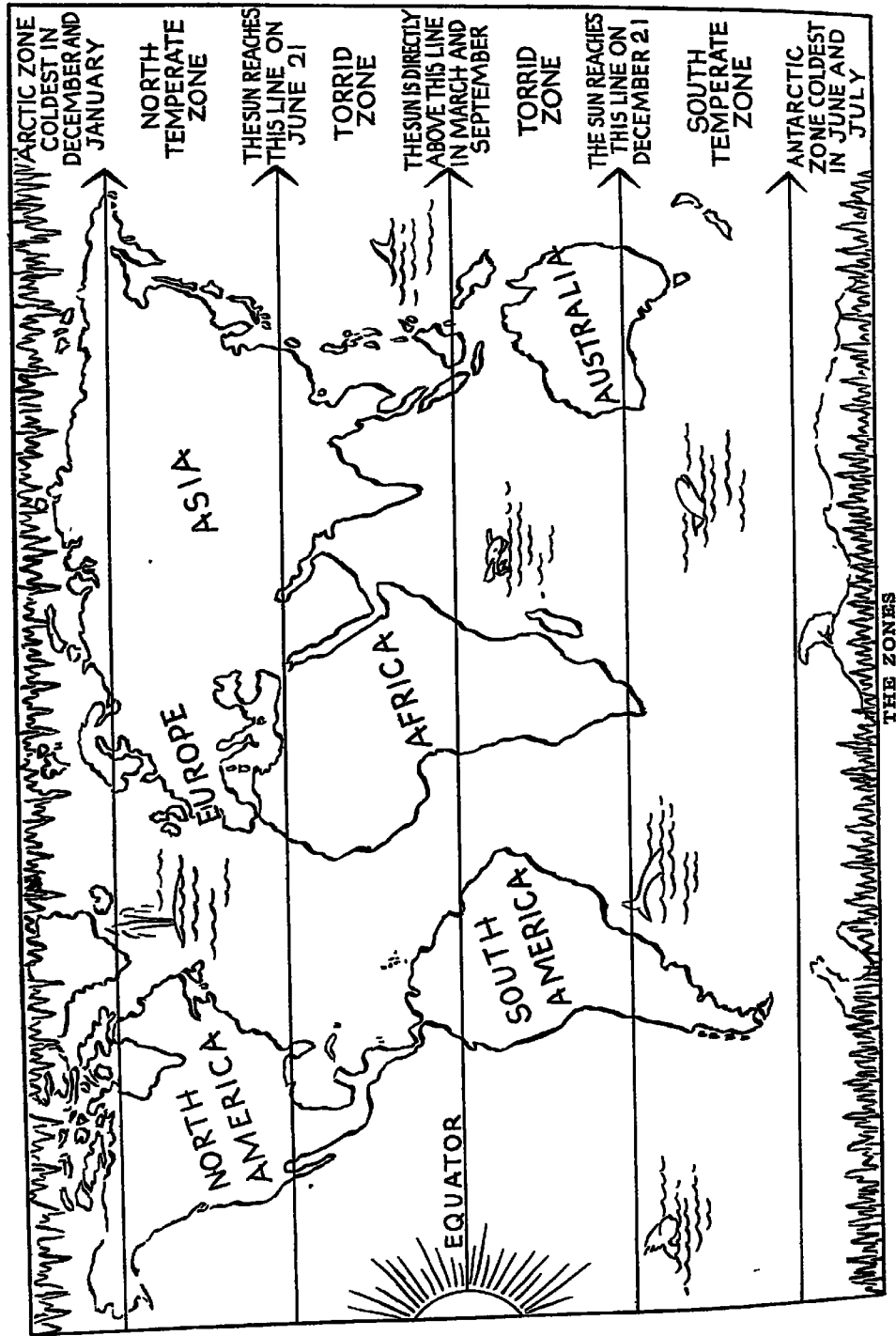


DECEMBER IN THE NORTH POLAR REGION



MARCH AND SEPTEMBER AT THE EQUATOR

SUN RAYS HEATING THE EARTH



1777. He stormed Forts Clinton and Montgomery, and was appointed commander in chief of His Majesty's forces in America, with the rank of lieutenant-general. In June, 1778, he evacuated Philadelphia, and on his retreat through New Jersey he fought with Washington at Monmouth. He went to South Carolina in December, 1779, and captured Charleston in the spring of the following year. In October, 1781, he set sail for Chesapeake Bay with a large force to aid Lord Cornwallis, but learned that Cornwallis had surrendered, and thereupon he returned to New York. In June, 1782, he returned to England.

CLINTON, Iowa, founded in 1835 and named for DeWitt Clinton, is the county seat of Clinton County, located on the Mississippi River, 138 miles west of Chicago, on the Chicago & North Western and on the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago, Burlington & Quincy, and the Chicago, Rock Island & Pacific railroads. The North Western machine shops are located here, and that road also maintains large stockyards. The manufactures include lumber, sash, doors and blinds, locks, machinery, internal combustion engines, furniture and other articles. Wartburg College, Mount Saint Clare Academy and Our Lady of Angels Seminary provide opportunities for higher education. Population, 1920, 24,151; in 1930, 25,726.

CLISTHENES, *klistheenes*, an Athenian statesman who lived about 500 B. C. He belonged to a notable family, and in early manhood acquired great influence. It was Clisthenes who prevailed upon Athens to adopt ostracism (which see), and the city later turning against him applied it to himself. His great service to his country was in the nature of reforms in the constitution, making it more democratic.

CLIVE, ROBERT, BARON OF PLASSEY (1725-1774), an English general and statesman, and one of the greatest Britons in Indian history. He went to India as a clerk in the service of the East India Company, and when in 1747 war broke out in India between the French and English he joined the army. By his capture of Arcot and his defense of it against a greatly superior force of French and natives in 1751, he won a very favorable reputation, and this was heightened by his future successes over the

French. In 1753 he sailed to England to recover his health, and he was received most cordially.

Two years later he was back in India, and he was in the same year placed in command of the expedition sent to Bengal. He took Calcutta and defeated the nawab of Bengal in a battle at Plassey, thus establishing English supremacy in India. He placed on the throne of Bengal a general of the defeated nawab, and through him he became possessed of great wealth. On his second return to England in 1760 he was accorded many honors, but he was sent back to India to straighten out the affairs of the East India Company. This he accomplished in about eighteen months. Returning to England, he was met with the accusation of having abused his power to gain wealth, and an investigation was made. His complete acquittal followed, but the disgrace of the accusation so preyed upon his mind that he committed suicide.

CLOACA MAXIMA, the great sewer at Rome, built about 2,500 years ago. A portion of it is still in use, and it may be seen under the Roman Forum and where it empties into the Tiber. It is about thirteen feet in width and depth.



CLOCK, a machine for recording the flight of time, measuring it in intervals of hours, minutes and seconds. It is a comparatively simple device; the necessary parts being a weight or spring, which furnishes the motive power; an escapement, which is connected with the pendulum or balance wheel; a train of wheels; a dial, and hands. The weight is attached to a cord, which is wound around a drum, to one end of which a large wheel is fastened. As the weight descends, the unwinding of the cord imparts motion to the train of wheels. The motion is regulated by a pendulum, which is connected with the escapement wheel, as shown in the illustration. As the top of the pendulum swings to the right, the tooth *A* of the escapement wheel escapes from the pallet *B*, while the tooth *C* is brought

against the pallet *D*. The ends of these pallets are so shaped that as the teeth of the escapement wheel are released by them, sufficient force is imparted to the pendulum to keep it swinging. The pinion of the escapement connects with cogs, usually called *leaves*, on a larger wheel, whose pinion connects with another large wheel, and so on until the necessary number of wheels is used to produce a rotation, once in twelve hours, of the wheel which carries the hour hand. Another wheel, carrying the minute hand, makes a complete rotation once an hour. The movement of the wheelwork is regulated by the vibrations of the pendulum. The clock can be made to run faster or slower by shortening or lengthening the pendulum; the pendulum of any common clock has a hand and screw below the bob for this purpose (see PENDULUM). The hands are attached to pivots, which pass through the dial, the pivot of the minute hand passing through that of the hour hand, so that each hand moves past the other without hindrance.

The striking part of a clock is entirely separate from the time-keeping part and is operated by a different weight or spring. It is, however, set in motion by a lever which is connected with the time-keeping part.

Invention of the Clock. Sun dials were the earliest instruments used for measuring time (see SUN DIAL). It is not known when the first attempts at clock-making were made, but there are accounts of such attempts as early as the seventh century. In the early part of the ninth century a clock was presented to Charlemagne, and in the following century one was given to Pope Sylvester II; but it is not known that these were clocks with wheels and a weight, like those of a later date. It is probable that the invention of the clock is due to the monks, who needed a timepiece which would enable them to discharge their various duties at stated periods. Clocks are known to have been in use early in the fourteenth century, and

some of them were quite elaborate. They not only marked the hours of the day, but they also indicated the course of the sun and moon and the ebb and flow of the tides. In the fourteenth century the first large clocks on steeples also appeared.

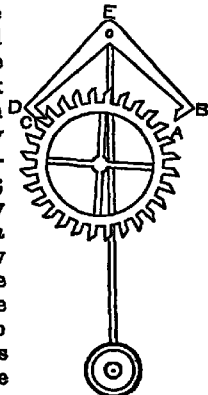
First Clocks in America. The first clocks used in the United States had no case, but they were fastened to the wall of the room near the ceiling, and the weights and pendulum were without protection. Later a case was added, which rested upon the floor and extended upward for six feet or more. For many years the works of all American clocks were of wood and were made entirely by hand. Finally, brass clocks replaced the wooden ones, and these at first were also made by hand, but later a die for casting the wheels from rolled brass plates was used. With the introduction of this invention, clock-making by machinery was inaugurated and machine-made timepieces took the place upon the market of those made by hand. The largest clock factories in the United States are in Connecticut.

Largest Clock in the World. Until recently the largest clock in the world faced New York harbor from a building in Jersey City, but it is now third in size. It was built for a soap company; the time can easily be read a mile away in New York City, for its face is 28 feet in diameter. The largest clock is now at the top of a hill a thousand feet high overlooking Santiago, Chile; its face has a diameter of 150 feet. The second largest is the Dow clock in Montreal, whose face is 60 feet across. The most famous clock is "Big Ben," in Parliament Building, London. See WATCH; ELECTRIC CLOCK.

CLOSED SHOP, a condition with respect to union labor which is explained in the article OPEN SHOP.

CLOTBUR. See COCKLEBUR.

CLOTH, a woven fabric, usually made of cotton, wool, flax or silk. But in tropical countries it may be made of the fiber of hemp, jute or other plants. Cloth is woven on the loom. The weaver uses two sets of threads, the *warp* threads, which are run lengthwise of the goods, and the *weft* or *woof* threads, which run across the warp. The *selvage* is the edge of the cloth, woven in such a manner as to prevent raveling. The warp takes various names; it is sometimes called the *foundation* or *back* of the goods, and the woof is often called the *filling*.



When one says that a piece of goods has a cotton back and a silk filling, he means that the warp is of cotton and the weft of silk. All-wool cloths have both the warp and the weft of wool, but most so-called woollens contain more or less cotton or other fiber. Worsted goods are made of combed wool that is well twisted.

The varieties of cotton cloth most extensively used are muslins, including sheetings and shirtings, as well as the finer goods of this name; also the cotton cambrie, canvas, duck, dimity, gingham and calico. Satinette, twedds, jeans and some cashmeres are made on a cotton warp with a weft of wool. Lawns, cambrics, Damascus sheetings and towelings are made of flax and are called linens. Cloth may be plain, like common muslin; twilled, like tweeds; piled, like velvet and plush; figured, like damask; mixed, like cheviot, and checked or striped, like gingham, according to the way in which the weft threads are woven into the cloth. The width of the cloth depends upon the number of threads in the warp; its fineness or coarseness depends on the size of the threads and their distance apart.

Related Articles. Consult the following titles for additional information:

Calico and	Linen
Calico Printing	Loom
Cambrie	Muslin
Canvas	Plush
Cotton	Satin
Crape	Shoddy
Crinoline	Silk
Damask	Velvet
Dimity	Weaving
Flannel	Woolen and Woolen
Flax	Manufacture
Gingham	Worsted

CLOTHES, *Moth*, MOTHE, the name given to several small moths whose larvae (young) are destructive to woolen fabrics, feathers and furs. They not only feed upon the material, but the larvae use it in the construction of the cases in which they undergo the pupa stage. It is not easy to prevent the damage done by the clothes moths, but airing and sweeping closets frequently, and beating, brushing and exposing clothes to the sunlight will diminish the ravages. Tobacco, camphor, tarred paper, naphtha balls and cedar shavings seem obnoxious to the insects.

CLO'THO, one of the three *Fates* (which see).

CLOUD, a visible mass of particles of water in the air; a mass of condensed vapor; atmospheric moisture condensed as rain or snow; a fog high in the air. All the above

definitions apply to the somber or gorgeous masses which float menacingly or lazily overhead.

Victor Hugo characterized them in *The Vanished City* as "the only birds that never sleep." Shelley, in *The Cloud*, summarizes their beauty and utility in the following stately lines:

I bring fresh showers for the thirsting flowers,

From the seas and the streams,

I bear light shade for the leaves when laid
In their noonday dreams

From my wings are shaken the dews that
Waken

The sweet buds every one,

When rocked to rest on their mother's
breast,

As she dances about the sun

I wield the flail of the lashing hail,

And whiten the green plains under,

And then again I dissolve it in rain,

And laugh as I pass in thunder.

Clouds differ from fogs only in their height and degree of density. The average height of clouds is calculated to be two and



FIG 1

one-half miles, thin and light clouds being much higher than the highest mountains; while thick, heavy clouds often touch low mountains, steeples and even trees.

Kinds of Clouds. Clouds differ much in form and character, but they are generally classified into four simple or primary forms:

(1) The *cirrus* (Fig 1), so-called from its resemblance to a lock of hair, consisting of fibers which diverge in all directions. Clouds of this description float at a general height of from three to five miles above the earth's surface.

(2) The *cumulus* (Fig. 2), a cloud which assumes the form of dense convex or conical heaps, resting on a flattish base. It is called also the summer cloud. Under ordinary circumstances these clouds accompany fine weather, especially in the heat of summer.

They attain their greatest size early in the afternoon and gradually decrease toward sunset.



FIG. 2

(3) The *stratus* (Fig. 3), so named from its spreading out uniformly in a horizontal layer, which receives all its additions in volume from below. It belongs essentially to the night, and it is frequently seen on



FIG. 3

calm summer evenings after sunset ascending from the lower to the higher grounds, and dispersing in the form of a cumulus cloud at sunrise.

(4) The *nimbus*, or *rain cloud*, is recognized by its fibrous border and uniformly gray aspect. It is a dense cloud, spreading out into a crown of cirrus and passing beneath into a shower. It presents one of the least attractive appearances among clouds, but it is only when the dark surface of this cloud forms its background that the splendid phenomenon of the rainbow is exhibited in perfection (see FOG; RAIN; WIND).

The first three primary forms of clouds are subdivided as follows: 1, the *cirro cumulus*, composed of a collection of cirri, and spreading itself frequently over the sky in the form of beds of delicate snowflakes; 2, the *cirro stratus*, or *wane cloud*, so called from its being generally seen slowly sinking and in a state of transformation—when seen in the distance a collection of these clouds suggests the resemblance of a shoal of fish, and the sky, when thickly mottled with them, is called in popular language a

mackerel sky; 3, the *cumulo stratus*, or *twain cloud*, one of the grandest and most beautiful of clouds, consisting of a collection of large, fleecy clouds overhanging a flat stratum or base.

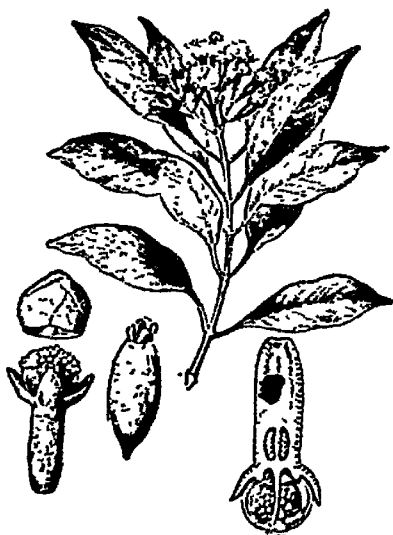
Cloud-burst, the name generally applied to an unusually heavy local rain. In the United States the term is restricted to a rain exceeding six inches and falling at the rate of ten inches, or more, per hour. Cloud-bursts cover only very small areas, usually but a few acres in extent. They cause the sudden overflow of streams and often convert dry channels into mountain torrents whose effect is very destructive.

CLOVER, *Klo'ver*, one of the most attractive and useful plants, recognized by botanists as a member of the pea family. It will grow wherever grass will flourish. There are more than 300 species, of which some are weeds, but many are valued as food for cattle. Common *red clover* lives for two years and sometimes, especially on chalky soils, for three years. This is the kind most commonly cultivated, as it yields better than any of the other sorts. *White clover* is a most valuable plant for pasturage over the whole of Europe, Central Asia and North America, and it has also been introduced into South America. The bee gathers much of its best honey from clover, for the blossoms are rich in nectar. It is important to know, too, that clover will not grow where there are no bumblebees, for they are necessary to its fertilization. Australia wished to grow clover, but they could not do so until the farmers imported bees.

Alsike, or *Swedish clover*, has long been cultivated in the south of Sweden, and now for over a score of years in other countries; it is strongly recommended for cold, moist, stiff soils. It resembles the common red clover in duration, stature and mode of growth. *Perennial red*, or *meadow clover*, much resembles the common red, but differs somewhat in habit, and the bright red flowers are larger and form a less compact head. Its produce is less in quantity and is not so nutritive as that of the common red. Clover is an excellent crop for exhausted lands, for the tubercles on the plant roots gather and store quantities of nitrogen, which go to restore the fertility of the soil.

CLOVES, *Kloves*, the dried flower buds of a tree which was first found in the Molucca Islands, but which is now grown in

various warm countries, including, to some extent, the West Indies. These buds, in powdered form, are used as a favorite condiment in cookery, and the oil of cloves has its place in medicine. The odor of cloves is fragrant; the taste sharp, warm and bitter. The tree is a handsome evergreen, from fifteen to thirty feet high, with large elliptic, smooth leaves and numerous purplish flowers on jointed stalks.



CLOVE

Opened and unopened flower bud and a longitudinal section of bud

OLOVIS, (465-511), king of the Franks, succeeded to the throne in 481. In 486 he overthrew the Roman governor at Soissons and occupied the country between the Somme and the Loire. He married a Christian princess, and he himself became a Christian as a result of the favorable outcome of a battle, for the success of which he had prayed to the God of his wife. In a struggle with the Visigoths he was entirely successful.

CLUB, a select number of persons in the habit of meeting for the promotion of some common object, as social intercourse, literature or politics. The building occupied is also called a club. The popular impression conveyed by the word is that of a group of men (or women—see **WOMEN'S CLUBS**) organized purely for social purposes, whose club rooms are arranged for luncheons, games, bowling, billiards, swimming and

the like, also with spacious reading and lounging rooms. Such a description applies to many clubs, but there are many others devoted to more serious matters. In all, however, there are attractive arrangements for bodily comfort.

There are clubs which give a great deal of time and large contributions of money to the study of civic reforms; to art; to engineering; to literature; to advertising. There are motor clubs, aero clubs, whist clubs, country clubs, athletic clubs, etc., many occupying permanent elaborate quarters, others in unpretentious surroundings, but all imbued with the "get together" spirit.

A popular trend of the club idea is seen in the rapidly-developing community centers (which see) and in town clubhouses maintained by towns for everybody for miles in all directions. The farmer and his family go to town and find rooms in a special building intended to minister to all bodily comforts; in many small cities these centers approach in attractiveness many city clubhouses.

The coffee houses of the seventeenth and eighteenth centuries were modest examples of the beginning of modern clubs, though they were but a kind of restaurant or tavern where people resorted to take their meals.

CLUNY, *kloo'ne*, **LACE**, the name applied to a strong handsome lace made by hand in Europe, and to a number of machine-made varieties found everywhere in American markets. Genuine cluny is made of linen thread, only one size of which is used. The imitation clunies are more loosely woven, and two sizes of thread, which are usually cotton, are employed. The hand-made lace is by far the more expensive. Because of its strength and beauty, cluny is popular as an edging for dresser scarfs and table linen.

The name refers to the museum of Cluny, in the French town of that name. In this museum specimens of ancient lace are preserved. Cluny, or Clugny, is situated in the department of Saône-et-Loire.

OLYDE, *khde*, a river of Scotland, formed by the union of several small mountain streams. On its shores is the city of Glasgow, below which it makes its way into the Atlantic through a broad estuary, or *firth*, ninety miles in length. The river itself is seventy-five miles long. The Clyde has large shipbuilding yards on its banks, and its

valley, known as Clydesdale, is noted for its orchards, coal and iron mines and a breed of fine horses.

CLYDE, LORD. See CAMPBELL, SIR COLIN.

CLYTEMNESTRA, *kli tem nad' trah*, in Greek mythology, the half-sister of Helen and of Castor and Pollux, and the wife of Agamemnon. During the absence of her husband in the war against Troy, she bestowed her favors on Aegisthus, and together they murdered Agamemnon on his return from Troy. Then with Aegisthus she governed Mycenae for years, until she, with her lover, was killed by her son Orestes.



Vegetation of Carboniferous Period

COAL, a black, or brownish-black, solid mineral which burns readily and gives off great heat. Most people are familiar only with the black variety; that which has a brownish tinge is known as *lignite*. Mankind has become so dependent upon coal that when the supply is reduced industry is retarded, and the entire economic structure is threatened. Coal runs our factories; it heats our buildings; it runs the great dynamos which provide light; it moves railroad trains and nearly all ships.

"Behind the men who battle in the trench
There stand the workmen at the lathe and bench;
But back of them and master of them all
The miner stands and holds the world in thrall"

If a lump of coal could tell us the story of its life it would carry the tale back millions of years, to a time when vast areas of the earth were swampy, supporting very luxuriant vegetation, when there were no men, no mammals, no birds. Only strange reptiles, strange fishes and other water animals whose species were long ago extinct lived upon the earth, whose climate was warm, even to the polar regions. During a long period of time known as the Carboniferous Period (which see)—nobody knows how many millions of years—coal was formed, layer upon layer, from the decaying vegetable matter of that humid age.

During these ages large areas of low land

were choked with vegetation, which died at the bottom, but kept growing at the top. As the plants died they partially decayed, and the weight of the vegetation above pressed them closely together. In the course of time these areas were depressed and covered with water and sand. After remaining under water for a long time, they were again elevated and the sand became rock, upon the surface of which soil accumulated, and in this flourished another growth of vegetation similar to that previously destroyed. In time this was sunk below the water and was covered. The pressure and heat attending these changes converted the vegetable matter into coal. There were as many upheavals and depressions as there are seams, or layers, of coal, and since these have not all been discovered, we do not yet know how many such changes occurred. The veins of coal and the rock lying between them, taken together, are known as the *coal measures*. The vegetation of the time resembled ferns, rushes and club mosses, and it also included certain species of trees that are now extinct. It was very luxuriant, the ferns forming trees twenty-five or more feet in height, and some of the club mosses exceeding in size the largest climbing plants of the tropical regions.

Varieties. Coal is divided into three varieties, according to its degree of hardness and the amount of carbon which it contains. These are anthracite, bituminous and lignite. The early geologists applied the name bituminous to a certain kind of coal, because it had some of the properties of real bitumen—it melts at a temperature far below the burning point. Later investigations proved that no kind of coal contains bituminous matter, but the name is still applied to the coal with 50 to 80 per cent of fixed carbon. Anthracite coal has from 80 to 90 per cent of carbon.

Anthracite. Anthracite is the hardest and best variety of coal. It is supposed to be that which was first formed, and it occurs deep in the earth. The largest mines are found in the eastern part of Pennsylvania and in Nova Scotia. Though some of the veins of anthracite occur at great depths, many of them, on account of the disturbance of the coal measures, have been thrown up and outcrop on the hillsides in the anthracite region. Veins of this sort are easily mined, since the coal is obtained by excavating a

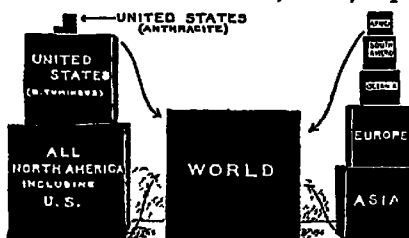
gallery or tunnel into the side of the hill. Anthracite is generally used for heating dwellings, and it is now to quite an extent employed in the manufacture of illuminating gas. It burns with little or no flame and without smoke, but it produces an intense heat.

Bituminous Coal. Bituminous coal is often known as *soft coal*. It contains much more bituminous matter than anthracite and is much softer; many varieties of it burn with considerable flame and produce a dense black smoke caused by the unconsumed carbon escaping into the air. This coal is found upon the western slope of the Appalachian Mountains, and the fields extend westward as far as the Mississippi River. The great coal fields of Ohio, West Virginia, Indiana and Illinois contain bituminous coal measures. Bituminous coal is much more extensively distributed than anthracite and is mined in much larger quantities. It is used on locomotives, in the manufacture of coke and for many other industrial purposes.

Cannel Coal is a variety of bituminous coal which is very compact and which when lighted, burns from one end of the lump like a candle; hence its name. It is desirable for burning in open grates.

Lignite This is the most recently formed coal, is usually of a brown color and con-

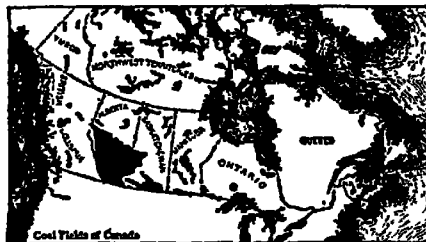
erally distributed over the earth. In Europe the leading coal producing countries are Great Britain, Germany, France, Austria, Belgium and Russia. The Russian fields are the most extensive on the Continent, but they have not been fully developed. In Asia coal is found in India, China, Japan



THE COAL OF THE WORLD

The portion cut from the anthracite cube represents the quantity already mined.

and the Malay Archipelago. It is supposed that the coal fields of China are the most extensive in the world, but as yet this is not known to be true. As far as discovered, the coal fields of Africa are in the southern part of the continent, in Cape Colony and the vicinity of the Zambesi River. There are also valuable coal fields in Australia, New Zealand and the Philippine Islands, and profitable mines have been opened in Mexico, Argentina and Chile.



COAL FIELDS OF UNITED STATES AND CANADA

tains more or less earthy matter. It is found in the coal measures west of the Mississippi River, and important mines have been opened in North Dakota, Montana and a number of states in the Rocky Mountains. Because of the scarcity of other fuel in these localities, lignite is of considerable local value, though its impurities render it useless for manufacturing purposes, and it does not burn as readily or produce as intense heat as either of the other varieties described.

Where It Is Found. Coal is quite gen-

As far as it is known the coal measures of the United States far exceed in area those of any other country. Altogether, they include over 300,000 square miles, or an area of more than six times the size of the state of Ohio. These coal fields are distributed as shown on the map herewith.

The coal measures of Canada are geologically extensions of those in the United States. The most important fields are in Nova Scotia and British Columbia. These fields yield a high grade of bituminous coal.

The coal produced in Saskatchewan and Alberta varies from a low grade of lignite to a good bituminous.

Production. The annual output of coal for the world is nearly 1,500,000,000 short tons. Of this, the average annual production in the United States is from 416,000,000 to 550,000,000 tons, of anthracite and bituminous combined. Great Britain produces in normal years about 250,000,000 tons, and Germany about 300,000,000 tons, of which half is lignite. France, Poland, Russia, Czechoslovakia, and Belgium each produce from 25,000,000 to 50,000,000 tons annually. Canada's production is relatively small, averaging about 15,000,000 tons, of which Alberta produces two-fifths, Nova Scotia a little less, and British Columbia about one-fifth.

Coal Reserves. The United States Geological Survey estimates that there is still in reserve in the ground unmined a vast amount of coal, estimated at over 3,000 billion short tons. These reserves, in part, are located as follows, in tons (000,000 omitted):

United States and Alaska	3,500,000
Canada	1,360,000
South America	130,000
Great Britain	166,000
Europe, Continental	360,000
Asia	1,900,000
South Africa	62,000
Australasia	200,000

Coal Mining. Coal is usually found in horizontal layers, except in the anthracite regions, where some veins are in an oblique position. In some mines the coal is so near the surface that the latter can be removed and the coal exposed. Mining is then a simple matter—as easy as quarrying and carried on in the same manner. When coal is deeper in the earth, such veins are often mined by excavating a gallery into the side of the hill, but most coal mines are entered through a vertical shaft, which is sunk to the bottom of the first workable vein. This shaft is rectangular in shape, usually 30 feet long and 8 to 10 feet wide. It is divided into four sections, in two of which the hoisting cages operate. Of the others, one is generally used for ventilation and the other for conveying pipes for pumping and electric wires. This division also has a stairway or system of ladders, which may be used in case the hoisting machinery is injured. From the foot of this shaft a gallery is excavated in opposite directions. If the

Outline on Coal

I. DEFINITION

II. VARIETIES

- (1) Anthracite
- (2) Bituminous
 - (a) Cannel
- (3) Lignite

III. FORMATION

- (1) Decayed Vegetation
 - (a) By pressure
 - (b) By heat
- (2) Upheavals
- (3) Coal Measures

IV. PRESENT SOURCES OF SUPPLY

- (1) United States
- (2) Great Britain
- (3) Germany
- (4) Other countries

V. METHODS OF MINING

- (1) Open working
- (2) Closed working
 - (a) Room-and-pillar system
 - (b) Long-wall system
 - (c) Ventilation

VI. BY-PRODUCTS

- (1) Coke
- (2) Gas
- (3) Tar
 - (a) Naphtha
 - (b) Creosote
 - (c) Pitch
 - (d) Dyes

Questions on Coal

What is coal? How is it formed?
What means have we of knowing the sort of vegetation from which coal was formed?

What are the classes of coal according to hardness?

Which is the best? Is it found near the surface?

Where are the largest mines of your variety?

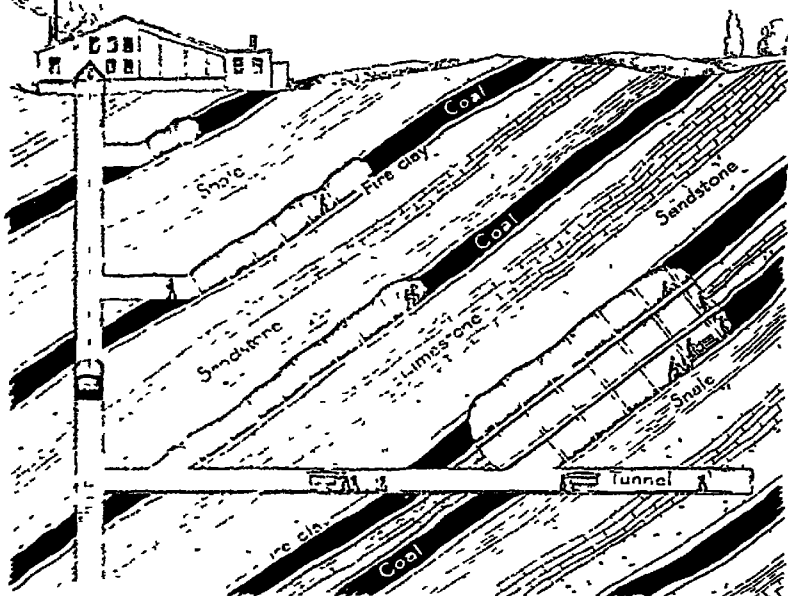
Which variety is known as soft coal?

Where are the great fields of this coal found? What are its important uses?

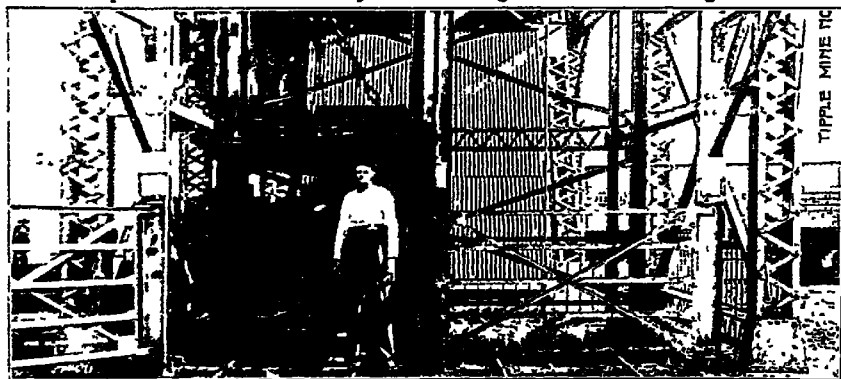
What is cannel coal? Why is it especially desirable?

Where is lignite coal found? How does it compare in age with other varieties? Why is it useless for manufacturing purposes?

HOW WE GET BLACK DIAMONDS



"Coal is preserved sunshine." The heat, light, and power which coal gives to us were stored in the earth many thousands of years ago. To get some idea of the enormous time that has passed, draw a line six inches long. Let that represent the time back to the last great ice-sheet which covered part of North America. Then think of a line 125 miles long. This line will represent the time from today back to the age when coal was being formed.



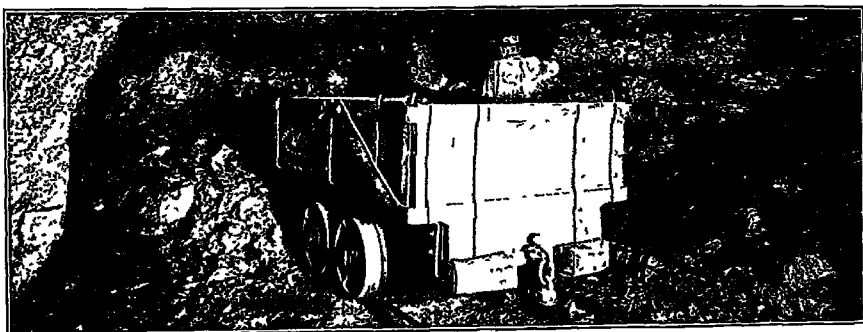
Courtesy Peabody Coal Company

This car of "black diamonds" has just arrived from the earth's vaults, a thousand or more feet below. For several years coal buyers have felt that they were paying for real treasure. But whatever the price, the miners send up a greater amount of coal every year. The total production in North America for a recent year would make a square pile fifty feet wide, as high as a two-story house, and would reach from the Atlantic to the Pacific Ocean (3,466 miles).



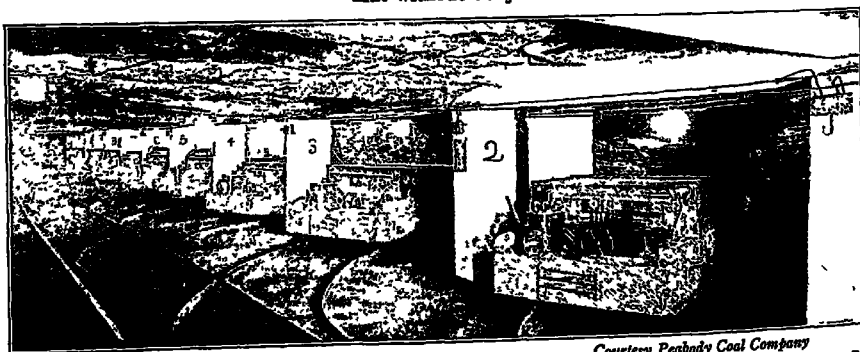
Courtesy Peabody Coal Company

A compressed-air machine undercutting seam before blasting. The use of labor-saving and time-saving devices in mines is constantly increasing, but at the best, the work of the miner is far from pleasant; darkness, dust, heat, not the best of air, danger of explosion from "fire damp"—these are some of the conditions which he must face every day when he goes down to get out the coal for your use.



Courtesy Peabody Coal Company

Coal broken down by blasting. When the car is loaded it will be hauled to the foot of the shaft and then to the surface. The United States produces more coal than any other country. Do we realize how necessary to our comfort coal is? "Coal stands not beside, but above every other natural resource: with coal everything is possible. The nation with coal commands, that without obeys."



Courtesy Peabody Coal Company

These electric locomotives haul trains of loaded cars in the many galleries of the mine. In small mines this hauling is done by mules. In addition to the fuel uses of coal, we get from it a variety of by-products: ammonia, aspirin, phonograph records, benzol, food preservatives, mothballs, "TNT," flavoring extracts, and perfumes.

vein of coal is deep enough to admit of working without the removal of rock, little or no rock is disturbed; otherwise, enough rock has to be excavated to enable the miners and trams to pass through the gallery. From this main gallery, other galleries are excavated at frequent intervals, running at right angles to the main gallery, and from each of these are still smaller galleries, leading into the vein of coal. The roof of the mine may be supported in one of two ways—by leaving pillars of coal at frequent intervals, or by the use of timbers. In a mine free from obstructions, the arrangement of galleries resembles very closely that of the streets in a well-planned city.

Tramways are laid in the main gallery and those leading off from it. Upon these, cars are hauled by mules or, in very large mines, by electric power, to the foot of the shaft, whence they are run upon the hoisting cages and elevated to the surface, where they are unloaded by dumping. In some of the coal measures, the shaft is sunk until it cuts a number of veins of coal, and in this case cars are hoisted from different levels; but in the bituminous fields it is not customary to work more than one vein at a time.

Because of the formation of gases (see FIRE DAMP), coal mines need to be more thoroughly ventilated than other mines. The ventilation is provided either by means of a fan at the foot of the shaft, to draw air from a fresh air shaft at another part of the mine, or by a fan on the surface, which forces the air in through a shaft constructed for that purpose. By the use of partitions the direction of the air current is controlled so that every part of the mine is ventilated. The portions newly opened are usually more dangerous than the others, for it is in these that the gases are liable to collect.

History. It is not known when or by whom coal was first used. It is referred to by Greek historians as early as 300 B. C., and it was in use in Great Britain as early as A. D. 852. It is supposed that the Britons were the first people to make practical use of it, and coal-mining was in successful operation in the island more than three hundred years before Columbus discovered America. The first discovery of coal in the United States, of which we have any record, was made by Father Hennepin near Ottawa, Ill., in 1679. The first mine worked

in the United States was opened at Richmond, Va., in 1750. Anthracite was mined as early as 1793, but on account of the difficulty of igniting it, it had not come into general use until the second quarter of the nineteenth century. Bituminous coal came into use in the United States earlier than this, but on account of difficulty of transportation it was not placed on the market until after 1820. From that date the use of coal became general, and with industrial development its uses have multiplied. However, within recent years petroleum and gas have come into such general use for fuel that the supremacy of coal is challenged.

Related Articles. Consult the following titles for additional information:

Carbon	Diamond
Carboniferous Period	Geology
Charcoal	Mining
Conservation	Peat

COALITION, *ko al ish'un*, **CABINET**, a cabinet representing the various political parties of a country. A Cabinet usually is strictly a one-party organization. It has always been so in the United States, as it is believed that the affairs of state can be administered more efficiently if the President's advisers hold the same political beliefs as he. Such a Cabinet makes for harmony. On the other hand, the one-party Cabinet frequently prevents the nation from profiting by the services of the strongest men for particular positions. This may become a serious matter in times of stress, as during the World War, a fact recognized by Great Britain as early as 1915. In May the Cabinet headed by Asquith was reorganized, and a new Coalition Cabinet was chosen, made up of Liberals, Unionists and a Labor member. As the war progressed several Cabinet changes were made, but the coalition principle was retained. There was considerable agitation in America after the country entered the war for a Cabinet representing more than one party. See **CABINET**.

COAL TAR, or **GAS TAR**, a substance obtained in the distillation of coal for the manufacture of illuminating gas. It is a dark-colored, more or less viscid, mass, with a strong, disagreeable odor. It passes over with the gas into the condensers, along with ammonia liquor, but being heavier than the latter, it is easily separated from it when the whole is allowed to stand. Within recent years a great number of valuable products have been derived from coal tar by

distillation, such as ammonia, naphtha, creosote, carbolic acid and benzene, while it is also the source of the whole series of aniline colors (see ANILINE), other dyes, of alizarine and salicylic acid. It is also utilized in the manufacture of roofing, concrete and tar paper, in road making, and in the production of a disinfectant, and is employed as a preservative of timber and as a protective paint. Its derivatives are marketed as oils, medicines, flavors, perfumes, etc. The stress of the World War demanded great expansion of the coal-tar industry in the United States and Canada. The advance made by the former country is described under the title DYEING.

COASTAL, *kos' tal*, **PLAIN**, in general, a plain formed along the coast by the action of waves and tides, but, particularly, that portion of North America lying along the coast of the Atlantic Ocean and the Gulf of Mexico and extending from about the latitude of New York to the city of Vera Cruz. The western boundary of this plain is the foothills of the Appalachian Mountains, and the upper portion of it is usually called the Piedmont region. The plain varies in width on the Atlantic coast from fifty to 200 miles, and from the Gulf of Mexico it extends northward into the Mississippi Valley as far as the Ohio River. A narrower section also extends south and west through Texas and along the coast of Mexico. Along the Atlantic coast the western boundary is marked by an abrupt rise, caused by the upheaval of the rocks which formed the mountains. This edge, or rise, is usually known as the Fall Line. Below this most of the streams are navigable, and at the fall line they furnish abundant water power. For these reasons numerous thriving cities are located along this line. Among these are Richmond, Va., Raleigh, N. C., and Columbia, S. C.

COAST AND GEODETIC SURVEY, **UNITED STATES**, a bureau in the Department of Commerce having charge of the surveys of the United States and its dependencies, including the interior, coasts and coast waters. This bureau was established in 1807 and was made a bureau in the treasury department, but its work was so delayed that but little was accomplished previous to 1832. From that year to the present time the scope of its work has been rapidly broadened. In 1878 the bureau was designated as the Coast

and Geodetic Survey, and in 1903 it was transferred to the department of commerce and labor. As now organized the bureau is in charge of a superintendent and operates under two divisions, the field division and the office division.

Some of the most important results accomplished by the bureau are the making of a minute survey of the coasts and the mapping of the same, together with the coast waters as far out as necessary, of the entire coast line of the United States, including Alaska, and of a part of the island possessions; the making of a network of levels over the eastern half of the United States, from the Atlantic Ocean to the Great Lakes; the making of important triangulations across the United States, notably that along the thirty-ninth parallel, and another along the ninety-eighth meridian, which extends into Mexico. The latest survey of importance covered the Philippine Islands and surrounding waters, completed in 1915.

COAST GUARD, the name applied since January, 1915, to the combined life-saving service and revenue-cutter service of the United States. The law by which the union was effected provides that operation shall be in charge of the Treasury Department in peace times, but that it shall operate in time of war as a part of the navy and be under the control of the Navy Department.

Life-Saving Service. This branch of the government was organized in 1871, prior to which date all activity of this nature was local and was supported by voluntary subscriptions. There are now 279 coast guard, or life-saving, stations, under an organization comprising thirteen districts. Stations are located on the Atlantic coast, the Gulf of Mexico, the Great Lakes, and the Pacific coast, including stations in Alaska. There is one purely inland station, at the falls of the Ohio River, near Louisville, Ky.

Equipment. Each station is equipped with a well-constructed building containing living quarters for the men—from ten to twenty—and space for boats.

The boats are usually two in number, each about twenty-five feet long and six to eight feet wide, and they are equipped with air chambers to prevent sinking. There is also in each station a small cannon whose range is nearly half a mile. The cannon shoots a projectile, to which is fastened a stout line, to a vessel in distress, when high seas make

it impossible to navigate the station boats When the line is seized by the vessel's crew it is used to haul ropes and breeches buoys from the shore, and in these the passengers and crew effect their escape (In connection with life-saving devices, see LIFE PRESERVER)

Revenue Cutter Service, a department which enforces laws relating to the interests of the United States on all waters belonging to the nation Under such supervision belong infraction of customs laws, quarantine regulations and neutrality in time of war. There are forty-four steam vessels in the service, and nineteen harbor and anchorage vessels The officers are commissioned in the navy and have the same pay and allowances as regular navy officers

Duties of the Coast Guard. In general, the duties of the service may be outlined as follows:

- 1 Rendering assistance to vessels in distress and saving life and property
- 2 Destruction or removal of wrecks, derelicts and other floating dangers to navigation
- 3 Extending medical aid to United States vessels engaged in deep sea fisheries
- 4 Protection of the customs revenue
- 5 Operating as a part of the navy in time of war or when the president shall direct
- 6 Enforcement of law and regulations governing anchorage of vessels in navigable waters
- 7 Enforcement of law relative to quarantine and neutrality
- 8 Suppression of mutinies on merchant vessels
- 9 Enforcement of navigation and other laws governing merchant vessels and motor boats
- 10 Enforcement of law to provide for safety of life on navigable waters during regattas and marine parades
11. Protection of game and the seal and other fisheries in Alaska, etc
- 12 Enforcement of sponge fishing law.

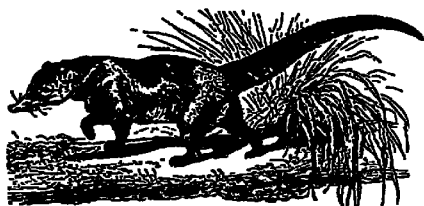
In addition to the foregoing the services of the coast guard include many other things, such as warning vessels running into danger, medical and surgical aid to the sick and injured, recovery and burial of bodies cast up by the waters, extinguishing fires, maintenance of public order, acting as pilots in emergencies and furnishing transportation to other branches of the public service

COASTING, a favorite winter pastime from the earliest days, and still in the United States the most popular winter sport with children, excepting, perhaps, skating The sleds used in coasting are made in a great variety of forms, some low and some high, some long and narrow. In some the runners are of solid board, shoed with steel,

while in others the runners consist of open iron framework, drawn forward and curved upward in front. Where the snow is loose the high sleds are better, but on a well-packed slide the low ones make better time and are easier to handle *Bobs* are constructed by fastening two ordinary sleds together by a long plank, the first one being attached to the plank by a pivot, which allows motion in steering. The steersman usually lies flat and grasps the forward sled in such a way that he may turn it easily, while the rest of the party group themselves behind him See TOBOGGANING; SKI.

COAST RANGE, a range, or series of ranges, of mountains, at a short distance from the Pacific coast, extending through the western part of California, across Oregon into Washington, where it is continued by the Olympic Mountains, and thence into British Columbia Some of the summits rise to a height of 7,000 and 8,000 feet, and among the best known in California are Mounts Hamilton, Tamalpais and Diablo. The San Bernardino Mountains are sometimes considered a part of the Coast Range

COATI, *ko ah'te*, the name of certain South American flesh-eating mammals, be-



COATI

longing to the raccoon family. The coati has a longer body than other members of the same family, and has a long, flexible snout. Coatis feed on worms, insects and the smaller quadrupeds, but chiefly on eggs and young birds. There are two species, the *Mexican* and the *Branhan*.

COBALT, *ko'balt*, a lustrous, steel-gray metal with a reddish tinge, related to iron and nickel, and generally occurring in combination with arsenic and sulphur. It is often found in the same ore with nickel. Cobalt is never found free in nature except in meteorites. Pure cobalt obtained from ores is harder and stronger than iron, takes a good polish, and will neither tarnish nor rust. It is of chief value commercially

through its compounds, some of which are used to color glass, porcelain and paper. Cobalt blue is one of the most important of these compounds. The metal has given its name to a town in Ontario, where silver ores containing cobalt are found in such abundance as to constitute the world's chief source of supply.

COBALT, ONT., a town in the Nipissing district, on Cobalt Lake and the Temiscaming & Northern Ontario Railway. The Cobalt region is one of the richest silver producers in the world. Cobalt silver was discovered here in 1904, and in a few years the annual shipments of ore were valued at \$16,000,000. In addition to silver there have been found large deposits of nickel and arsenic. A large machine shop and foundry and several ore concentrators are located here. The town is 330 miles north of Toronto. Population, 1931, 3,885.

COBB, IRVIN SHREWSBURY (1876-), a newspaper man and special correspondent, called by journalists the most brilliant of American reporters. His right to this distinction seemed confirmed by articles from his pen from the war zone in Europe, beginning in September, 1914.

Cobb was born in Paducah, Ky. He learned shorthand and became a reporter on a home paper. Soon greater Kentucky papers secured his services, and in 1904 his fame had reached New York City, whither he was called as special writer on the *Sun* and the *World*. At the outbreak of the World War he was engaged by the *Saturday Evening Post* of Philadelphia to write exclusively for it on the gripping war topic. While on visits home during the war he was in constant demand for lectures on the conflict. His writings are filled with humor and originality. In book form have appeared *Europe Revised*, *Paths of Glory*, *Back Home*, *Roughing It De Luxe*, *Speaking of Prussians*; *Love Talks with Dead Ones*, *Old Judge Priest*, *The Glory of the Coming*, *The Abandoned Farmers*, *Incredible Truth*, and *Both Sides of the Street*, as well as many others less famous. Cobb is doubtless the only man who ever made money from an operation on himself for appendicitis; he wrote about it in a long article *Speaking of Operations*.

COB'DEN, RICHARD (1804-1865), an English statesman, known as the "apostle of free trade." His first political writing was

a pamphlet entitled *England, Ireland, and America*, published in 1835. In this he gave clear utterances to the political views to which he adhered throughout his life, advocating non-intervention in the disputes of other nations, and maintaining it to be the only proper object of the foreign policy of England to increase and strengthen her connections with foreign countries in the way of trade and peaceful intercourse. In 1841 he entered Parliament, and he directed his efforts toward the repeal of the Corn Laws. The credit for the repeal, which was accomplished in 1846, belonged largely to Cobden.

COBLENZ, ko'bients, GERMANY, the capital of the Prussian Rhine province, is situated at the meeting place of the Rhine and the Moselle rivers, about fifty-seven miles southeast of Cologne. The city has many fine educational institutions, and a number of interesting medieval buildings. The chief industry is the production of Moselle wine. Other principal manufactures include boats, dyes, pianos, paper, machinery and sugar. The city is a center for railway and river traffic. The central railway station just outside the city walls of former days is a junction point for the Cologne-Mainz and the Metz-Berlin railways.

The important buildings are the church of Saint Castor, the castle of the electors of Trier, the Metternich house, and the palace of Clement Wenceslaus.

Drusus the Roman general established a military post here. Population, 60,000.

COBH. See QUEENSTOWN.

COBRA, or COBRA DE CAPELLO, ko'-bra de kah pe'lo, a poisonous hooded snake, found in Southern Asia. It is also called *spectacled snake* from a singular marking on the back of the neck. So exceedingly poisonous is its bite that in numerous instances death has followed within a few minutes, and under ordinary circumstances, where prompt measures have not been taken, a few hours is the longest time a person can expect to live. In India thousands of natives lose their lives yearly through cobra bites. It is probably the most deadly serpent known and does more damage than any other. The cobra is sometimes six feet in length, and when angry it raises its head and about a third of its body, swells its neck into a wide hood and assumes a very terrifying appearance. Its food consists of small reptiles, birds, frogs and fishes.

COBWEBS, a term applied to webs spun in out of way places by certain species of spiders, therefore more properly called spider webs. See **SPIDERS**, for description.

COCAINE, *lo'ka in*, or *ko kané*, a white crystalline substance prepared from the leaves of a shrub called *coca*. When injected beneath the skin or in contact with the mucous surfaces, cocaine produces insensibility, and accordingly it has been used extensively by dentists and oculists in deadening the sensation of pain during minor operations. Cocaine has a quieting and restful influence, but its use tends to breed a dangerous habit, as does the use of opium.

Coca, the shrub whose leaves furnish the useful drug, is native to South America, and cultivated in Ceylon, India and Java. It grows from three to six feet tall and produces small yellow flowers, and leaves resembling those of the tea plant. The dried leaves of the plant, mixed with pulverized chalk, are chewed by the South American Indians. The leaves have a stimulating effect, but their use is considered harmful.

COCOSUS, *kol'kus*, a genus of scale insects. The males are elongated, have large wings and apparently no means for sucking, but the females are rounded or oval, about an eighth of an inch in length, have no wings and possess a beak or sucker by which they take up the juices of plants. At a certain time the females attach themselves to a plant. Here they lay their eggs and die, the bodies of some species drying up and forming habitations for their young. While some of these insects are garden and greenhouse pests, others are of great value; for example, kermes, cochineal and gum lac are either perfect insects dried, or the dried secretions which the insects have formed. See **LAC**; **COCHINEAL**.

COCHIN-CHINA, *lo cheen'*, or *ko'chin*, a French possession, forming part of the peninsula of Southeastern Asia, between Cambodia and Annam on the north and the China Sea. Its estimated area is 26,476 square miles. The country is traversed by the Mekong, the deposits of which have produced an exceedingly fertile soil. In the low and wet grounds much rice is grown. In the more elevated districts are grown tobacco, sugar cane, maize, indigo and betel. Among the other products are tea, gums, coconut oil, silk and spices. The natives excel in the use of wood, of which their temples and

tombs are built. Saigon is the capital. Population, 1932, 4,475,000.

COCHINEAL, *kahch'neel*, a dyestuff, consisting of the dried bodies of a species of insect, a native of the warmer parts of Amer-



COCHINEAL INSECTS ON CACTUS
Male and female

ica, particularly Mexico. The insects, which are found living on a species of cactus, are gently brushed off, and are killed by being placed in vats of hot water, in ovens or under the heat of the sun. A pound of cochineal contains about 70,000 bodies. The finest cochineal is prepared in Mexico, where it was first discovered. Cochineal produces crimson and scarlet colors and is used in making carmine and lake. Algiers, Southern Spain and Peru are other sources of this dyestuff.

COCKATOO', the name of a number of species of climbing birds believed to be a member of the parrot family, although naturalists assume that these birds form a group by themselves. They have large hard bills, crests capable of being raised and



COCKATOO

lowered at the will of the bird, tails somewhat longer than those of the parrots, and long wings. Most of the cockatoos are white in plumage, though some of them are tinged with yellow or red. Their home is in Eastern Archipelago and Australia, where they live on roots, fruits, grain and insects. They can be easily tamed and are often kept in captivity, where some learn to speak a few words.

COCKCHAFER, a species of beetle, remarkable for the fact that it exists four or five years in the larval stage, during which time it preys upon the roots of grass and stalks of corn. In its adult stage it is about an inch long and is black in color. As it usually comes from the ground about the beginning of May, it is called the *May bug* or *May beetle*. It is destructive to leaves of various trees.

COCKFIGHTING, a cruel amusement practised in various countries, first, perhaps, among the Greeks and Romans. It consists of causing roosters, or male fowls, to fight until one is vanquished, which occurs only when one is so badly injured that it cannot live. It was long a favorite sport with the British, and the training, dieting and breeding of cocks for fighting was the subject of many treatises. The cruelty of the sport led to its being discontinued among the better classes of people. Until prohibited by law there was much cockfighting in the United States.

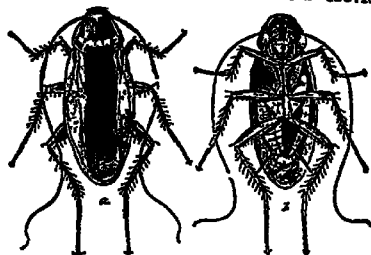
COCKLE, *kok'l*, a name for bivalve mollusks common on the sandy shores of the ocean and much used as food. The two valves of the shells are nearly equal and have two small teeth, one on each side near the beak, and two larger remote teeth, one on each side. The shells of some species are beautifully marked and colored.

COCKLEBUR, *kok' l bur*, or **CLOTBUR**, a troublesome weed, of which three species are known in temperate regions of North America. The burs, which are hard and covered with hooked prickles, are about an inch long, and as a number of these are borne on every plant the weed is a great nuisance in pastures or ranges where cattle or sheep feed. It is difficult to get them out of the wool of the sheep after they are once imbedded there, and, accordingly, efforts are always made to exterminate the weed in wool-raising districts. As the plant dies to the ground every year, it is not difficult to control its growth, if the plants are destroyed each year before the seed ripens.

COOK OF THE WOOD. See **CAPER-CAILIE**.

COCKROACH, an insect which is one of the most obnoxious pests that infest houses. It has an oval, elongated, flattened body, which is smooth on its upper surface. The males have parchmentlike wing covers, and the wings of the females are imperfectly de-

veloped. They are exceedingly agile in the night time, and are troublesome in houses, bakeries and wherever food is plentiful, as they eat all kinds of provisions. As they conceal themselves in cracks and crevices,



COCKROACH

a, view from above; b, view from below.

they very frequently find their way through water pipes and steam pipes into all rooms of a house.

The cockroach is a great enemy of the bedbug. Each female lays about thirty eggs in each of two compartments of a small case, which she carries about with her for seven or eight days. The young when hatched are nearly the same form as their parents, except that their wings are not well developed. There are about 1,000 species known. Various insect powders guaranteed to kill them are on the market; some housewives destroy them by pouring boiling hot water into the crevices where they hide.

COCOA. See **CACAO**.

COCONUT, or **COCOANUT**, *ko'ko nut*, an oval, woody fruit, from three to eight inches in length, covered with a thick, stringy husk and holding, inside, a firm, white, fleshy kernel. Within, the fruit is hollow, or partially filled with milk, a sweet and watery liquid of a whitish color. The thick husk, which protects the fruit, aids in spreading the tree among the islands where it is native, because the nut floats readily and may be carried long distances without injury. The cocoanut is the fruit of a palm which grows a straight, naked trunk from forty to sixty feet in height. The summit is crowned by featherlike leaves, among which the nuts hang in clusters of a dozen or more.

The cocoanut forms a large part of the food of the islanders, who eat it as it comes from the tree, either ripe or green. A large quantity of oil is obtained by pressing the fruit, and this is known as cocoanut butter,

which is exported and used in the manufacture of marine soap, in making stearin candles and for numerous other purposes. The cabbagelike bud at the top of the tree is boiled and eaten by the natives. From the sap a beverage is made which, when fermented, is called palm wine, and, when distilled, is known as *arrack*, a very strong liquor.

But the usefulness of the cocoanut tree does not end here. The natives use the leaves to thatch cottages, and from the fibers they make mats, cordage, baskets, sacks and other useful articles. The shells are made into beautiful cups, ladles and other ornamental utensils. From the trunks boats are made, or timbers for the construction of houses. The tree, which is a native of Africa, the East and West Indies and South America, is now grown almost everywhere in tropical countries and is one of the most useful trees in the world. A greater acreage is given to cocoanuts in Ceylon than to any other product of the soil. The tree begins to bear when about ten years of age and continues to produce from fifty to one hundred years without special attention.

COD, one of the most important of the food fishes. In the cod family there are two groups—the shore cod and the deep-sea variety. Millions are taken every year, but the supply remains constant, for cod are very prolific. A single female weighing seventy-five pounds has been found to contain close to 9,000,000 eggs. The destruction of eggs and young, which are preyed upon by other fish for food, is enormous, but the number growing to maturity is always ample.

Shore cod are confined to the temperate zones, but deep sea cod have a much wider range. The common cod, which constitutes the well-known food fish, has a slightly flattened body which tapers abruptly to the tail. It reaches maturity in about three years, but



COD

it is of sufficient size to be marketable when two years old. When full-grown the fish weighs from twelve to twenty pounds, though larger specimens are sometimes taken.

The cod spawns in February, and the best months for fishing are October, November and December. The most noted fisheries are the Grand Banks, off the coast of Newfoundland.

The fish are caught by hook and line. The fishermen go out in schooners, to each of which two or more small boats are attached. When it reaches the fishing grounds, the schooner anchors, and the fishermen put out long lines called *trawls*, to which are attached at frequent intervals shorter lines bearing hooks. A good-size schooner will put out lines containing from 10,000 to 15,000 hooks. After the trawls have been set the fishermen go along the lines in their small boats and haul in the fish that have been caught. When brought to the schooner, the fish are immediately dressed, split open and salted. The livers are saved, as from them cod-liver oil (which see) is obtained. As soon as the schooners receive a load they return to port, where the fish are stretched on platforms and exposed to the sun and air, and are dried and salted. The cod is the most important food fish taken off the eastern coast of North America.

CODE NAPOLEON, the basal law of the French nation, promulgated in 1804 and still in force. After the French Revolution there was wide diversity in the laws in various parts of France, and a new code, general in its application, was demanded. Napoleon, as First Consul, interested himself in the making of the new Code, and it was named for him. From time to time other governments adopted either the letter or the spirit of the Code Napoleon. It became the basal law of the French province of Louisiana, and the laws of that state are yet built on it. It is the basis of the laws of Quebec, which was and is yet essentially French; it has been adopted widely in South America and Central America, and it is still in force in Belgium, Holland, in several cantons of Switzerland and to a considerable extent in Italy.

CODE WRITING, a system of writing messages in such a way that the meaning can be learned only through a key to the code used. For example, figures may be substituted for letters, 1 standing for A, 2 for D, 3 for H, and so on. Sometimes certain words are made to stand for other words, or the letters may be variously juggled about. It is said that there is no code so intricate that someone cannot decipher it. The

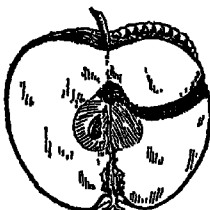
codes devised by governments for their secret messages are usually as intricate as ingenuity can make them; this is especially true in wartime. However, no code can be so baffling that experts cannot in time find the key to it, though many days of patient study may be required. Codes of the telegraph and cable companies are compiled in book form; they are not secret, but are used to shorten messages.

CODLING MOTH, a small moth whose larva is the familiar apple worm. The eggs are laid on the leaves or on the forming fruit, and when the grubs appear a few days later, they eat their way into the tiny apples at the point where the flower has fallen off. When a larva has reached its growth it emerges, seeks a sheltered place in a crevice of the bark or on the ground, and spins its cocoon.

In many localities the moth appears within a few weeks, and a second brood of grubs is ready for the late crop of apples. The codling moth is the most destructive of apple pests, the estimated damage in the United States being

about \$10,000,000 yearly. The best remedy is a thorough spraying with an arsenic solution just after the blossoms fall, and a second spraying about three weeks later. The poison should fall on the upturned flower ends of the little apples, for the worms must be killed before they have a chance to burrow in the fruit. When wormy apples fall to the ground they should be disposed of so as to kill the larvae, and as many of the cocoons as possible should be collected and destroyed before the moths emerge.

COD-LIVER OIL, an oil extracted from the livers of different species of cod. It is a pale yellow oil, of very disagreeable odor and taste, and is obtained by pressing it from the livers in a cold state, or by heat. It is easily digested, and if not taken in too large quantities, is considered an extremely valuable remedy in all wasting diseases. On account of its disagreeable taste, it is administered in capsules and various other forms. The milky mixture, known as *emulsion*, consists of a preparation of cod-liver oil with other remedies.



THE APPLE WORM

CODY, WILLIAM FREDERICK (1845-1917), better known as "BUFFALO BILL," was born in Scott County, Iowa. He spent his early life among Indians on the Western frontier, but at the beginning of the Civil War he offered his services as a Union scout, and rendered valuable aid to several commanders.

Cody was later a member of a camp of United States troops which protected the laborers during the construction of the Union Pacific Railroad, and he took the contract to supply the entire force with fresh buffalo meat for a certain period, hence his sobriquet of "Buffalo Bill." Later he collected a band of Indians, cowboys, rough riders, unbroken bronchos and a small herd of buffalo, and commenced a series of exhibitions in the principal cities of America. The show was known as the "Wild West Show." He made several tours of Europe with his exhibition.

COEDUCATION, *ko ed u ku'shun*, education of both sexes in the same schools. As public schools originally existed only for boys, when girls first began to attend elementary schools it was necessary for them to receive instruction separately, but in the same buildings with the boys. In this way coeducation began, and though it has been opposed in many quarters, the system has made steady advance in all progressive countries. In America boys and girls attend the same public schools from the kindergarten through high school, except in a few cities, and coeducation prevails in nearly all colleges and universities. Yale, Princeton and Harvard, however, are for men alone, while Columbia admits women only to certain departments, and only the graduate department of the University of Pennsylvania is coeducational. Women are admitted to all the state universities. Private schools are about equally divided on the subject of coeducation. In Canada, England, France and Germany women are admitted to the universities, but the English universities award them certificates instead of degrees. Generally speaking, the majority of elementary schools in Europe are mixed schools, but the reverse is true of the high schools.

COELENTERATA, *so len ter a'tah*, the next to the lowest branch of the animal kingdom, including many-celled animals, all of which are very simple organisms, which have no distinct body cavity and no distinct circulatory system. They have a body cavity in which food is digested and from which it is

carried to all parts of the body through branches of the cavity. These animals are more or less symmetrical, their parts radiating from a center. Peculiar stinging organs, or thread-cells, are located in the tentacles, which are grouped around the mouth. By means of these tentacles food is captured and stunned or paralyzed by the stinging cells. Nearly all coelenterata are marine animals, and two distinct types are known: one, the free-swimming, bell-shaped form, medusa; and the other a more or less cylindrical form, fixed to some support. Some, like the coral animal, build in populous colonies and cover a great area of sea bottom. In color many of them are brilliant and show a great variety of delicate shades. See HYDRA; SEA ANEMONE; CORAL, SPONGE.

COEUR D'ALENE, *ker da layn'*, IDAHO, the county seat of Kootenai County, thirty-three miles east of Spokane, Wash., on the Chicago, Milwaukee, Saint Paul & Pacific, the Northern Pacific, the Great Northern and the Spokane International railways. There is also a municipal airport. The city has a Catholic academy, banks, a city park and Memorial Athletic Field, both containing forty acres. It is a center for woodworking and boat-building factories. The surrounding scenery is excelled in but few spots in the Northwest. Population, 1920, 6,447, in 1930, 8,297, a gain of 28.7 per cent.

COFFEE, the seed or berry of an evergreen shrub, or small tree, which is cultivated in warm countries. The name also is given to a dark-brown, fragrant table beverage which is made from crushed coffee berries. The use of coffee is almost world-wide, particularly in cool climates, and its consumption is steadily on the increase, notwithstanding the objections which are insistently advanced against it.

Coffee contains a somewhat bitter principle called caffeine (*kaf'e'in*, or *kaf'een*). In medical practice this is a drug, and it is a stimulant, with effects both harmless and bad, depending on the quantity taken. When from one to three or four grains are taken the effect is mildly stimulating, and it is declared that such a quantity does no harm to the normal person, who limits his coffee drinking to one cup at each meal. Excessive use of coffee leads to nervousness, sleeplessness, trembling hands and the like.

The coffee tree, when wild, grows from fifteen to thirty feet high, but in cultivation

it is seldom allowed to exceed six feet. The leaves are dark green and have a waxy appearance on the upper surface. The flowers are white and appear in the axils of the leaves. The fruit is an oval, dark red berry, resembling a cherry when ripe. Each berry contains two cells, and each cell has a single seed, which forms the coffee nut or bean. These parts of the plant are shown in the color plate. Before roasting the seed is of a light green color. The tree lives for about forty years and bears fruit from the time it is three years old. The average yearly yield is about one pound of seeds to the tree, though some trees may produce from two to five pounds.

When ripe, the fruit is gathered by placing canvas under the trees and shaking them. The berries are dried in the sun, then passed between rollers, which crush the dried pulp, but do not crush the seeds. The fragments of pulp are then removed from the seeds by winnowing. After being thoroughly dried, the seeds are packed in large sacks, in which they are shipped to market. The brown appearance of the coffee found in retail stores is due to the roasting. Since the aroma developed by the roasting evaporates rapidly, coffee should not be roasted until it is desired for use. The different varieties, such as Mocha, Java and others, may be due to the locality from which the coffee is obtained, the real Mocha coming from Arabia, but they are all liable to be produced from the seeds of the same orchard, the name *Mocha* usually being given to the small beans, and *Java* to the larger ones. Mixtures of these produce other varieties. (See plate p 3526).

Sources of Supply. Coffee is produced in Arabia, adjoining countries and to a small



COFFEE PRODUCTION

The diagrams picture the yield of coffee in five principal producing countries. The figures represent millions of pounds grown annually.

extent in northern Africa; but the principal producing region is Brazil, which now raises over two-thirds the world's supply. Coffee

Outline on Coffee

I. THE PLANT

- (1) Characteristics
- (2) Leaves
 - (a) Surface
 - (b) Color
- (3) Blossoms
 - (a) Fragrance
 - (b) Color
 - (c) Shape
- (4) Fruit
 - (a) Bean
 - (1) Size
 - (2) Color
 - (3) Cells

II. CULTIVATION

- (1) Necessary conditions
- (2) Where grown
 - (a) Brazil
 - (b) Central America
 - (c) Mexico
 - (d) West Indies
 - (e) Ceylon
 - (f) Java

III. CONSUMPTION

- (1) United States
- (2) Canada
- (3) Germany
- (4) France
- (5) Austria
- (6) Other countries

IV. CONDITIONS OF GROWTH

- (a) Heat
- (b) Shade
- (c) Moisture

V. FOOD VALUE

Questions on Coffee

What is the height of the coffee tree? How would it compare in size with the plum tree?

What is the average number of pounds of coffee per tree from each crop?

What is the color of the berry before being roasted?

Describe the leaves, the blossoms, the fruit.

How are the berries gathered? How dried? How is the husk removed? How is coffee packed for shipment?

Of what countries is it a native?

Where does the best coffee come from, and what is it called?

is shipped from Santos, Brazil, in greater quantities than from any other port in the world. Next to the five countries shown on the preceding page as the greatest producers, other countries raise it in practically the following number of million pounds per year: Costa Rica, 72; Mexico, 60, British India, 34; Nicaragua, 30, Porto Rico, 18, before the hurricane of 1928, which destroyed a large portion of the coffee trees, but production there is again on the increase, as new trees are coming to producing age.

The World's Largest Consumer of Coffee.

The United States is by far the largest consumer of coffee, and it is also the largest consumer per capita among the nations. More than a third of the crop finds its market there. Officials estimate that coffee imports every year provide twelve pounds for each person in the nation. As children are not coffee drinkers, and many adults drink little or none, the consumption by confirmed users is about twenty-five pounds each every year. It is reported that radio advertising has materially increased the use of coffee in the United States and Canada.

Next to the United States, France is the greatest user, per capita, and The Netherlands is third; then in order are Germany, Italy, Sweden and Belgium. Argentine leads in South America, and is next to Belgium; following is Denmark, then Great Britain. The latter country consumes a great deal of tea.

COFFERDAM, a temporary enclosure which engineers build under the surface of water for the purpose of securing a dry foundation in the construction of bridges or piers. Usually it is formed of two or more rows of piles driven close together, with clay packed in between the rows. When the structure is completed the water in the enclosure is pumped out. Such is the most inexpensive form of cofferdam.

COFFEYVILLE, KAN., founded in 1869, is a city in Montgomery County, one and one-half miles from the Oklahoma state line, on the Missouri Pacific, the Missouri, Kansas & Texas, and the Atchison, Topeka & Santa Fe railroads. There is a municipal airport. Industry largely centers around petroleum and lead and zinc products. The city claims the largest zinc oxide plant in the world. There are also manufactures of oil-well machinery, tank cars, structural steel, and dairy products. There are two parks, a large ball-

field, and a children's pool. The municipal auditorium seats 2,500 people; there is also a Carnegie Library, and the city has two hospitals. The commission form of government, with mayor and two commissioners, is in force. Population, 1930, 16,198.

COFFIN, the chest or box in which a dead body is enclosed for burial. Coffins were used by the ancients chiefly to receive the bodies of persons of distinction. Among the Romans before the Christian Era it was the custom to consume the bodies by fire and deposit the ashes in urns (see **CREMATION**), but stone coffins were later introduced. In Egypt coffins seem to have been universally used in ancient times. They were of stone, earthenware, glass and wood. The ancient Greeks made a coffin of a peculiar kind of limestone, which in a few weeks absorbed the flesh and other tissues of the body. This stone was called *sarcophagus*, and the coffins made from it took the same name, which means *flesh-eating*. Coffins among Christians were introduced with the custom of burying. Modern coffins are usually made of wood and are sometimes enclosed in a leaden case. Some tribes of Indians make basket coffins.

COHAN, **GEORGE MICHAEL** (1878-), a versatile and widely known theatrical producer, actor and dramatist, was born at Providence, R. I. At the age of nine he appeared professionally in the play *Daniel Boone*. Later he acted in vaudeville with his father, mother and sister, the family being billed as the Four Cohans. Cohan also starred in *Little Johnny Jones*, *George Washington, Jr.* and *Broadway Jones*, all of which he himself wrote. He is the author or adapter of numerous other successful plays, including *The Talk of New York*, *Get-Rich-Quick-Wallingford*, *Seven Keys to Baldpate*, *Hit-the-Trail Holiday* (based on the character of "Billy" Sunday), *The Song and Dance Man*, *The Home Towners*, and *American Born*. Cohan achieved great success in O'Neill's *Ah Wilderness*. Of the many popular songs he has written the best known are *So Long*, *Mary* and *Over There*. The latter was the most successful of the scores of light songs inspired by the World War, and it became immensely popular. Cohan also appeared in moving pictures.

COHESION, *ko he'shun*, in physics, is that property of matter by virtue of which particles of like substance adhere to one another when brought into close contact.

Solids have greatest cohesion, liquids have little, and gases entirely lack it. Cohesion causes the substance in brick, iron, etc., to stick together and retain the shape of the objects. For the property which causes particles of unlike matter to adhere to one another, see **ADHESION**.

COHOES, *ko hose'*, N. Y., founded in 1720 and chartered as a city in 1870, is nine miles north of Albany and three miles west of Troy, at the confluence of the Mohawk and Hudson rivers, and on the Delaware & Hudson and New York Central railroads. Electric railways run to all nearby cities. The chief manufactures include cotton cloth, underwear, rayon, knit goods, paper and wall paper. There are over 300 manufacturing establishments. There is a large power plant which generates 50,000 horse-power, furnishing power to all the leading mills. The city was given the Indian name for the falls in the Mohawk at this point. Population, 1920, 22,987, in 1930, 23,226.

COINING, the art of converting pieces of metal into current coins for the purposes of commerce. Coining is usually done in a government establishment, called a *mint*. Coining is one of the prerogatives of the supreme power in all nations, and counterfeiting or otherwise tampering with the coin is severely punished. In some cases small nations have their coins made by other countries, but they retain full power to regulate their coinage systems. In the United States the bureau of the mint was established as a division of the Treasury Department in 1873. It has charge of the coinage for the government and makes assays of precious metals for private owners (see **ASSAYING**).

In the United States and Canadian mints the metal is first melted and cast into a bar. It is then *refined*, after which the alloy is added to harden it, the proportion being one part alloy to nine parts pure metal. The metal is then *cast* into ingots, which are taken to the *rolls*, where they are reduced to bars. The rolling machines are four in number, the rollers being adjustable and the space between them governed by the operator. About 200 ingots are rolled per hour with each pair of rollers. When the rolling is completed the strip is about six feet long. As it is impossible to roll perfectly true, it is necessary to *draw* these strips after they are softened by *annealing*. The drawing benches resemble long tables, with a bench on either side, at

the end of which is an iron box screwed to the table. In this are fastened two perpendicular steel cylinders with the space between them equal to the required thickness of the bar. As the bar is drawn between these cylinders they reduce it to an absolutely uniform thickness.

These strips are now taken to the *cutting* machines, each of which will cut 225 blank coins per minute. The *press* now used consists of a vertical steel punch. From a strip worth \$1,100 about \$800 of blanks will be cut. These are then removed to the adjusting room, where they are adjusted. After inspection they are weighed on very accurate scales. If a blank is too heavy, but near the weight, it is filed off at the edges; if too heavy for filing, it is thrown aside with the light ones to be remelted. The blanks, after being adjusted, are taken to the coining and milling rooms, and are passed through the *milling* machine. The blanks are fed to this machine through an upright tube, and as they descend are caught upon the edge of a revolving wheel and carried about a quarter of a revolution, during which the edge is compressed and forced up. By this apparatus 560 dimes can be milled in a minute; for large pieces the average is 120. The massive but delicate *coining* presses coin from 80 to 100 pieces a minute. These presses are attended by women. After being stamped, the coins are taken to the coiner's room. The light and heavy coins are kept separate in coining, and when delivered to the treasurer they are mixed in such proportions as to give him full weight in every delivery. By law, the deviation from the standard weight for gold coin must not exceed the one-hundredth part of an ounce to \$5,000, and for silver coin, two-hundredths of an ounce to \$1,000. Only the most perfect machinery can assure such results. See MINT; MONEY.

COINS, FOREIGN, VALUE OF. Each nation has its own system of coinage, and different units serve as bases of monetary systems. The United States and Canadian unit is the dollar; the British, the pound sterling; the French, the franc; the German the mark. The comparative value of all these units and those of other countries is given in the following table, the equivalents indicated applying when exchange conditions between nations are at par. In times of economic and financial depression, these values may fluctuate greatly.

Gold is the standard unless otherwise specified.

Country	Monetary Unit	Equivalent in U S Money
Argentina	Peso	\$0.9643
Austria ..	Schilling ..	.1407
Belgium	Belga ..	.1390
	Franc (paper) ..	.0278
Bolivia	Boliviano ..	.3650
Brazil	Milreis ..	.5462
British Honduras	Dollar ...	1 0000
Bulgaria	Lev ..	.1930
Canada	Dollar ..	1.0000
Chile ..	Peso1217
China ..	Tael (silver) .	.6314-.7034
Colombia ..	Peso9733
Costa Rica	Colon ..	.4653
Cuba ..	Peso	1.0000
Denmark	Krone ..	.2680
Dominican Republic	Dollar ..	1.0000
Ecuador ..	Sucre ..	.2000
Egypt ..	Pound	4.9431
Estonia ..	Kroon ..	.2680
Finland ..	Markka ..	.0252
France ..	Franc ..	.0392
Germany ..	Reichsmark ..	.2332
Great Britain and Dominions in Aus- tralia and Africa	Pound ..	4 8665
Greece ..	Drachma ..	.0130
Guatemala	Quetzal ..	1.0000
Haiti	Gourde ..	.2000
Honduras ..	Lempira ..	.5000
Hungary	Pengo ..	.1749
India (British) ..	Rupes ..	.3650
Indo-China ..	Piaster (silver) .	.4554
Italy ..	Lira ..	.0526
Japan ..	Yen ..	.4985
Latvia ..	Lat ..	.1930
Liberia ..	Dollar ..	1 0000
Lithuania ..	Litas ..	.1000
Mexico ..	Peso ..	.4085
Netherlands ..	Guilder ..	.4020
Newfoundland ..	Dollar ..	1 0000
Nicaragua ..	Cordoba ..	1 0000
Norway ..	Krone ..	.2680
Panama	Balboa ..	1.0000
Paraguay ..	Peso ..	.0943
Persia ..	Kran (silver)....	.0776
Peru ..	Libra ..	4 8665
Philippines	Peso ..	.5000
Poland ..	Zloty ..	.1122
Portugal ..	Escudo ..	1.0605
Rumania ..	Leu ..	.1930
Russia ..	Ruble ..	0.2000
Salvador	Colon ..	.5000
Siam ..	Baht (tickal)....	.4424
Spain ..	Peseta ..	.1930
Straits Settlements	Dollar ..	.5678

Sweden	Krona ..	2680
Switzerland	Franc1930
Turkey	Pound	4 4000
Turkey	Piaster ..	0440
United States..	Dollar ..	1 0000
Uruguay ..	Peso	1 0342
Venezuela ..	Bolivar ..	.1930
Yugoslavia ..	Dinar ..	.1930

COIR, *kwahr*, fiber from the husk of the coconut, from which are manufactured matting, bagging, ropes and cables. Coir cordage, because it lasts well in salt water, and also because it is light, strong and elastic, is preferable in many respects to ropes of hemp. Mats and matting are now largely made of coir, which is also used in coarse brushes, for stuffing mattresses and for other purposes.

COKE, a variety of charcoal, made by burning bituminous coal with a limited supply of air. The coal is usually burned in a brick or stone kiln, called an oven. The coal is put through an opening at the top of the oven, and the coke is taken out at the bottom. A ton of coal will produce about two-thirds of a ton of coke. Coke is also formed as a by-product in the manufacture of illuminating gas. Good coke has an iron gray color, is hard, porous and brittle. It is almost pure carbon and is extensively used in smelting iron and other metals, since the sulphur contained in the coal injures the metal. Coke is also used to some extent as a fuel for heating purposes. It is manufactured in large quantities, in sections where bituminous coal of the proper quality is found, or in places to which it can be transported economically to industrial centers.

COKE, EDWARD, SIR (1552-1634), an eminent English lawyer. He was chosen recorder of the cities of Norwich and of Coventry, knight of the shire for his county and attorney general. As such, he conducted the prosecutions for the crown in all great state cases. In 1613 he became chief justice of the Court of King's Bench, but because he opposed James I and supported liberal measures in Parliament, he was in 1621 committed to the Tower and soon after expelled from the privy council. In 1628 he was chosen member for Buckinghamshire and was one of the chief authors of the Petition of Right. His principal works are legal textbooks of the highest value, the most famous being *Coke upon Littleton*; or *the First Institute*.

COLCHICUM, *kol'kik um*, the name of a group of plants whose common representative is the meadow saffron. This is a bulbous-rooted, stemless, perennial plant. From a small corm or bulb buried about six inches deep and covered with a brittle brown skin, there rises in the early autumn a tuft of flowers having much the appearance of crocuses, flesh-colored, white or even variegated. They soon wither, and the plant disappears till the succeeding spring, when some broad leaves are thrown up by each corm, along with a seed vessel. From the seeds is obtained a bitter alkaloid drug called *colchicine*.

COLD, **COMMON**, the medical name for which is *coryza*, formerly ignored to as great a degree as possible by those afflicted and endured with as much fortitude as could be summoned, but now recognized for the dangerous malady it really is. A cold manifests itself by inflammation of the nasal passages, and is due to infection by a microorganism that medical science does not fully understand. A severe cold brings warning of its approach by an irritating dryness in the nose, followed within a few hours by the beginning of a watery discharge which increases in intensity. If unchecked, the thin, watery discharges are accompanied in time by discharges of more solid, yellowish, purulent matter, all the while the patient suffers temperatures above normal, which may develop fever. A cold always invites other dangerous maladies.

The sufferer from a cold should remain in bed during the period of most serious manifestation, and avoid human contacts, so far as possible, for coryza is highly contagious. Little food should be taken, regardless of the old adage, "Stuff a cold and starve a fever." During continuance of the fevered condition, much water should be drunk. Internal remedies prescribed by a physician are preferred to nostrums snuffed through the nose.

COLD STORAGE, a system of cooling or freezing, whereby any commodity can be kept indefinitely at a given temperature. An ice box or refrigerator in the home is a cold storage plant on a small scale. In large buildings erected solely for cold storage there are rooms where the temperature is maintained a few degrees above the freezing point and others where it is always below freezing. Some commodities will be destroyed if frosted, while others must be frozen if they are to be preserved for any

great length of time. For example, potatoes keep best at a temperature of 36°; bacon and ham, 40° to 45°; while butter, if it is to be kept in storage for several months, should be kept at 10°; fish, at 15° to 18°. Furs are stored in summer in vaults whose temperature is reduced to 30° to 35°.

In addition to air-tight rooms, a storage plant consists of machinery for cooling the air and pipes from it to all rooms to convey the cooled air. The method of cooling in the best plants is by evaporation, using a volatile liquid such as ammonia. Sulphuric ether, sulphurous acid and carbonic acid are used to some extent.

The refrigeration idea has been applied also to railroad cars, but here ice or carbice is used to maintain low temperatures. Through such refrigeration cities in northern latitudes are able to secure berries, fruits and vegetables from warm southern sections months before such products can be ripened at home. For explanation of the substance carbice, see CARBONIC ACID GAS.

COLD WAVE, a wind or anti-cyclonic condition of the atmosphere, which produces a sudden fall of temperature of several degrees. In the United States and Canada cold waves usually come from the northwest, but sometimes they come from other directions. They are generally characterized by a high barometer and a clear atmosphere. Sometimes they extend so far south in the spring as to cause great damage to the fruit crop. The most extensive cold waves are caused by a large area of high pressure, which seems to cover the earth with a blanket of cold air. The Weather Bureau is able to predict cold waves twenty-four or thirty-six hours in advance of their arrival. The signal indicating their approach is a white flag with a large black square in the center. See CLIMATE; WEATHER BUREAU.

COLEOPTERA, *ko le op'te rah*. See BEETLE.

COLERIDGE, SAMUEL TAYLOR (1772-1834), an English poet, associated with Wordsworth in the production of the *Lyrical Ballads* at the beginning of the Romantic Period. Coleridge was born at Ottery Saint Mary, in Devonshire. From his childhood he was a voracious reader, and such books as the *Arabian Nights*, which he read as a child, undoubtedly influenced the course of his genius. He entered Cambridge University, but did not remain to graduate, and

shortly after leaving the university he became interested with Southey in a scheme for founding an ideal community on the banks of the Susquehanna. As no unmarried people could join this community, Coleridge and Southey married in 1795, sisters, but their scheme went no further than this, as they had no funds to carry it out.

In 1796 Coleridge took a cottage at Nether Stowey in Somersetshire, and here he lived for two years as a neighbor of Wordsworth and his sister. The two young men, with Dorothy Wordsworth, took long rambles, and together they planned the *Lyrical Ballads*, which appeared in 1798. Coleridge's most notable contribution to this was *The Ancient Mariner*. In the same year he traveled in Europe with Wordsworth, and on his return he settled in Keswick. In 1804 he went to Malta, thinking to gain some relief from the rheumatism, but returned two years later without having benefited his health. To gain escape from his rheumatic pains, he had taken to opium, and the habit rapidly mastered him. Unable to fight against it alone, he lived from 1816 until his death chiefly with Doctor Gillman in London, leaving his family to the care of Southey. He was to a certain extent successful in mastering the habit, but it had seriously impaired his ability to work and his powers of concentration, never great, and he produced little that was noteworthy during his later years. Coleridge's conversational abilities were great, however, and during these years in London he was the center of a group of young men who met once a week to hear him talk.

All the poetry for which Coleridge is most celebrated, *The Rime of the Ancient Mariner*, *Christabel* and *Kubla Khan*, was written in a little over a year. Few poets have attained so high a place with so small a body of work; yet the wonderful melody of his verse, its imagery, its fancy, its suggestiveness, entitle him to rank with the truest of English poets.

COLERIDGE-TAYLOR, SAMUEL (1875-1912), a modern English composer, of African descent. He studied at the Royal Academy from 1890 to 1896, achieving distinction as a composer. His most important work was a musical setting for the wedding scene of Longfellow's *Hiawatha*. He composed music for some of Stephen Phillips'

dramas, and wrote a sacred cantata, *The Atonement*, besides numerous songs, ballads and orchestral compositions

COLFAX, *kol'faks*, SCHUYLER (1823-1885), an American statesman, born in New York City. He became prominent as a Whig editor in Indiana and was elected to Congress in 1854, serving until March, 1869. From Dec 7, 1863, to March 4, 1869, he was Speaker of the House, and was elected on the Republican ticket Vice-President of the United States in 1868. During his incumbency of that office he was accused of complicity in postal frauds and the Credit Mobilier scandal, but nothing was proved against him. See CREDIT MOBILIER.

COLGATE, WILLIAM (1783-1857), a manufacturer of soap whose philanthropy to Hamilton Literary and Theological Seminary at Hamilton, N. Y., induced a change of name to Colgate University in 1890. Colgate was born in England, but emigrated to the United States; about 1850 he established his business, which his family continued.

COLIC, *kol'ik*, a cramping pain in the stomach or intestines. It is a common ailment of babies, especially during their first six months of life. The most frequent cause is taking food into a stomach which has not rested sufficiently from a previous feeding. That is, too frequent feeding should be avoided. In some cases of colic the pain is caused by gas in the stomach or intestine. If the gas is in the stomach relief may be given the baby by holding him upright or laying him on his stomach. A change of position or trotting the baby sometimes helps intestinal colic. Better measures than these are a hot bath, a hot-water bag applied to the abdomen, and a cloth dipped in turpentine applied to the same place.

COLIGNY, *ko leen'ye*, GASPARD DE (1517-1572), a French admiral and Huguenot leader, who won distinction in the wars of Francis I and Henry II. He was made admiral in 1552. After the death of Condé, he became commander in chief of the Huguenots, and on the night of Saint Bartholomew's Day he was put to death. See BARTHOLOMEW'S DAY, SAINT.

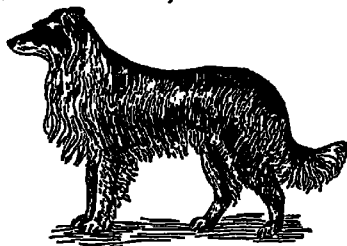
COLLATERAL, *kah lat'er al*, in business and law, is anything of value pledged as security for the performance of an act, such as jewelry pledged as guarantee of payment of a sum of money to a private individual or bonds held by a bank as security for the pay-

ment of a loan. Collateral must be something which can be readily converted into cash in case the debtor fails to meet his obligation. In such event he loses the property deposited as collateral, unless from its sale the creditor realizes more than the amount due him. Such residue would be returned to the debtor, less costs involved.

COLLEGE, a term embodying several meanings, but applied most commonly in North America to an educational institution of higher rank than a high school or academy, but not so broad in scope as a university. As the term is understood in the United States, a college may be a part of a university, or it may be an independent unit. For instance, the university is generally made up of a college of liberal arts and various professional schools, as is true of the state universities, but an independent school giving instruction in literature, history, science, etc., without having special professional schools or departments is properly a college. This distinction is shown by comparing Radcliffe College with Harvard University and Barnard College with Columbia University. In each instance the colleges are women's schools of liberal arts affiliated with the larger institutions.

Canadians use the term in much the same way, but apply it more loosely. Some Canadian high schools and academies are called colleges, and a high school of first rank in Canada is occasionally called a *collegiate institute*. It often happens, too, that the college belonging to a particular university is located in a different city from the main institution. For example, McGill University of Montreal maintains colleges in Victoria and Vancouver, B. C.

COLLIE, *kol'i*, a variety of dog especially common in Scotland, because of its intelli-



COLLIE

gence of much use to shepherds. The collie will take a flock of sheep to pasture, keep them together, protect them from wolves and

bring them all back safely at night. This dog is of medium size and varies much in coloring. Black and white collies are common, and those with black bodies and tan-colored legs are thought to be particularly handsome. The collie's head is somewhat fox-shaped, his ears are erect, but having drooping points, and his tail is rather bushy, with a strong curl upward. Collies are household pets in various countries.

COLLINS, MICHAEL (1890-1922), one of the most brilliant leaders in the struggle to free Ireland from British rule. While yet a boy he joined the republican movement, and as he was a ringleader in the uprising at Easter, 1916, he was imprisoned for nearly a year. He managed to escape the British dragnet for Irish revolutionary officials in 1918, and from that time was a Sinn Féin leader. His organizing ability almost alone brought peace and the erection of the Irish Free State in 1921; in the latter work Arthur Griffith was prominent, also. In the next year Collins was assassinated by a political enemy, on a peaceful Sunday morning while on his way to church.

COLLINS, WILLIAM (1721-1759), an English poet. While studying at Oxford he wrote his Persian *Eclogues*, and in 1746 he published his *Odes, Descriptive and Allegorical*. Although this volume was unsuccessful, it contained some lyrics which entitle Collins to high rank among eighteenth-century poets. Best known of his poems are the *Ode on the Passions*, the *Song from Cymbeline* and the ode beginning "How sleep the brave who sink to rest."

COLLINS, [WILLIAM] WILKIE (1824-1889), a well-known English novelist whose fame rests on his brilliant and well-constructed detective stories. He was a friend of Dickens, who had much to do with his decision to devote himself to literature rather than to the law, for which he had been educated. Among his best-known works are *Armada! After Dark, The Woman in White, The New Magdalen, The Evil Genius* and *The Moonstone*.

COLLODION, a substance prepared by dissolving gun cotton in ether, or in a mixture of ether and alcohol, which forms a useful substitute for adhesive plaster in the case of slight wounds. When the fluid solution is applied to the cut or wound, it immediately dries into a semitransparent, tenacious film, which adheres firmly to the

part, and under it the wound or abrasion heals without inflammation. In a slightly modified form collodion is also employed as the basis of a photographic process called the *collodion process*. The common small toy balloons are made of collodion. A solution of it is poured into a flask, which is then rolled around so that the collodion will form in a coating of equal thickness over the inside: then the air is exhausted from the flask and the collodion film pulls off and is easily removed.

COLOCASIA, *kolo kashia*, a genus of plants, native of the East Indies, whose tubers contain much starchy matter which is used as a food after the acrid juice has been separated by boiling or washing. In the Pacific Islands the colocasia is called *taro*; in Hawaii, *poi*; in Japan, *satoimo*; in China, *yu-tao* and in Central America, *oto*.

COLOGNE, *ko lone'*, a city of Rhenish Prussia, on the left bank of the Rhine, forming, in connection with Deutz, a fortress of the first rank. There are many fine old buildings, as well as excellent modern ones, but the most important edifice of all is the cathedral (see below).

Cologne was one of the most important members of the Hanseatic League and one of the most populous cities of Europe until the sixteenth century, when a decline set in. With the nineteenth century, progress began. The old part of the city dates from the third century, and it was built on the shore of the river. In modern times a new city has grown up in rough semi-circular form around the old town, and it ranks with other world cities in beauty. It manufactures almost every commodity known to modern industry, and include heavy machinery, chemicals, sugar, tobacco products, Cologne water, and paper. Cologne is now third in size among German cities. Population, 1933, 756,600.

Cologne Cathedral, one of the finest specimens of Gothic architecture in the world. It was begun in 1248 and was not completed until 1880. It is in the form of a cross 444 feet long, and has two enormous towers, the loftiest church towers in Europe, each 512 feet high. The roof is 200 feet high and has a central tower 350 feet high. In the interior are pillared aisles, beautiful altars, mosaics, paintings, statuary and magnificent windows of stained glass. In the treasury are kept very many valuable jewels, precious stones and many sacred relics.



COLOMBIA, at the north-eastern extremity of South America, is a republic, fifth in area among the countries of that continent. Previous to 1902 it included in its area the present republic of Panama, geographers now class the latter as a part of the North American continent. The exact area of Colombia is uncertain, but it is about 447,535 square miles, and the population (1928) is 7,851,000, about eighteen people to the square mile.

This census includes, practically all Indians in the country, whose number is given as about 70,000. The language of Colombia is Spanish (see DEMARCATION, LINE OF). The country was named in honor of Christopher Columbus, and has been inhabited by white men, at first few in number, almost from the time Europe was able to take advantage of the discovery of the continent. The capital city is Bogota (which see).

Surface and Drainage. The surface is very mountainous. The Andes, entering from Ecuador, divide in southwest Colombia into three branches, namely, the west range; the central range, which has the highest peaks in Colombia, including the volcanoes Tolima, 18,000 feet high, Huila and Purace; the eastern range, a continuation or branch of the central, from which it is separated by Magdalena River. This chain divides in the north, the eastern extending into Venezuela, and the western extending northward, joining the Sierra Nevada de Santa Marta near the coast. There are many rivers, the chief of which is the Magdalena, which has a length of 1,000 miles and is navigable for almost 850 miles. The tributaries are the Cauca and the Atrato, the Meta and the Guaviare, the latter two tributaries of the Orinoco, and the Negro and Japara, both affluents of the Amazon.

Climate. The climate varies in different parts. The coast plains are generally hot and damp, while the central plateaus and high tablelands have a pleasant and healthful climate and abundant rains. In the southwest portion the plains are exceedingly dry.

Mineral Resources. Colombia is rich in minerals. The mountainous regions abound in gold and silver. The chief center of gold mining is Antioquia, of silver, at Tolima and Cauca. The petroleum output has risen to 16 million barrels a year. Iron, copper, lead and salt are found to some extent. Emeralds of an exceedingly fine quality are mined in the State of Boyaca. There is a good deal of coal, but as yet it has not been mined to any considerable extent.

Agriculture. There is a vast area of good soil, but only a small portion is under cultivation. Agriculture is the chief industry, but most of it is yet carried on by primitive methods. Coffee, tobacco and sugar cane are grown in the hot regions, and wheat, corn and barley in the more temperate parts. In the deep forests vegetation is very luxuriant. The banana tree is found in most parts, and that fruit is an important article of export. So inadequate is transportation that it costs more to bring wheat to the coast towns from the interior than to bring it by vessel from the United States.

Transportation. There are not many railroads, owing to the mountainous character of the country, there are now more than 2,000 miles in operation. The absence of good country roads (there are only 4,200 miles of motor roads), most of them being merely beaten tracks, is partly compensated for by navigable rivers. There is airplane service.

Education. Education is largely maintained by the state. Besides the public schools, there are a university at Bogota (founded in 1572), a national institution for workmen and a school of arts and trades. The elementary schools are free, but attendance is not compulsory. Seventy-three per cent of the people are unable to read, Indians and negroes compose most of this total.

Government. The President and Vice-President are chosen for four years by an electoral college. There is a Council of State of six members. The Congress consists of two houses, a Senate of fifty-eight members, and a House of Representatives of 131 members. Each of the fourteen departments into which the republic is divided has a governor appointed by the President and an assembly elected by the people.

History. In 1536 the united forces of the Spaniards overcame the Indians who dwelt around this region, and after this Spanish

settlements rapidly grew up. In 1740 a viceroyalty under the name of New Granada was formed, comprising the present Colombia. In 1811 an insurrection against Spain broke out, and nine years later independence from Spain was secured. In the same year New Granada and Venezuela united to form the republic of Colombia, and Ecuador joined later; but this union lasted only until 1831, when the republic of New Granada was formed. There followed revolutions and political strife, with frequent changes in the constitution, until 1861, when a federal constitution was adopted and the name was changed to the United States of Colombia. In 1886 the present centralized republic was formed, the states now becoming Provinces. The Province of Panama broke away in 1903, and formed the Republic of Panama.

In 1921, the United States paid \$25,000,000 to Colombia as a partial recompense for the loss of Panama, which declared its independence when Colombia refused to ratify a canal treaty with the United States.

COLOMBO, capital of the island of Ceylon, and its principal west-coast port. It has a protected harbor, and is popular as a bunkering point on the sea route to and from Australasia and the Far East, and has an extensive trade of its own. Chief exports are rubber, tea, and coconut products; imports include iron and steel, canned goods, and piece goods. There is a Roman Catholic and an Anglican bishop. Population, 1931, 284,155; the inhabitants are cosmopolitan in character, chiefly Singhalese and Tamils.

COLON, *ko lon'*, a seaport of the Republic of Panama, on Manzanillo Island, on the north coast of the Isthmus of Panama. It is at the Atlantic end of the Panama Canal, and is also the terminus of the Panama Railway. The city was founded in 1850, and then named Aspinwall, in honor of a New York financier, who was chiefly responsible for the construction of the first railway across the isthmus; later it was renamed Colon, for Christopher Columbus. The land on which the city is built belongs to the Panama Railway, under the terms of its original franchise, and the railway is now the property of the United States government. Adjoining Colon, on Limon Bay, is the American town of Christobal, where have been located great refrigeration plants and railroad shops.

The harbor of Colon, which is deep but exposed, has been improved by the erection

of a long breakwater, and the city is now a port of call for over a dozen lines of steamers. Unlike most Central and South American ports, it has good docks and piers, at which steamships may take on and discharge cargoes. Although Colon, for purposes of government, is in Panama, all matters of sanitation and quarantine are under the control of the United States. The city was formerly extremely unhealthful, but United States sanitary engineers under General Gorgas made it entirely safe as a place of residence. Population, 1920, 40,886; 1930, 57,161.

COLON, *ko'lohn*, a portion of the large intestine, consisting of three parts, known as the *ascending*, *transverse* and *descending* colons. The colon tube begins on the right side of the abdominal cavity where the small and large intestines join, and ends in the lower left side of the abdomen, where it communicates with the rectum. See illustration, accompanying the article **ABDOMEN**.

COLONEL, *kur'nel*, a military officer in command of a regiment. He ranks below a brigadier-general and above a lieutenant-colonel, who is above a major. The rank corresponds to captain in the navy.

In the United States Army, the colonel wears a silver eagle with spread wings on his shoulder straps as insignia of rank.

In Canada, the colonel wears, either on shoulder straps or on sleeves, a crown and two stars. The colonel has rank corresponding to a captain in the navy. See **ARMY**; **RANK**.

COLONIES AND COLONIZATION. A colony, in a strict sense, settlement formed in one country by the inhabitants of another, but now it is used loosely to describe a territory distant from, but dependent upon, another country. The ambition to extend territory, the desire to increase wealth, and, latterly, the necessity of providing an outlet for the surplus population of Europe, have been the chief motives in colonization.

Portuguese Colonies. The Portuguese were the first great colonizers among modern states. In 1419 they discovered Madeira, the Azores and the Cape Verde Islands; soon after they reached the Congo and the Cape of Good Hope, and before 1500 Vasco da Gama had landed at Calicut, in India. The first Portuguese colonies were garrisons along the coasts where traders stopped, but real colonies were established in Ceylon in 1505

and in the Moluccas in 1510. Brazil was discovered in 1499, and it fell to Portugal by the Bull of Demarcation and was colonized about 1530. Bad government at home and the subjection of the country to Spain caused the loss of most of the Portuguese colonies. The Portuguese now possess several territories in India, China and the Indian Archipelago. In Africa they possess the Cape Verde Islands, settlements along the coast and other islands amounting in area to about 700,000 square miles.

Spanish Colonies. Soon after the Portuguese, the Spaniards commenced the work of colonization. In 1492 Columbus discovered the island of San Salvador. Hayti, or San Domingo, Porto Rico, Jamaica and Cuba were soon colonized; before the middle of the sixteenth century Mexico, Ecuador, Venezuela, New Granada, Peru and Chile were subdued, and Spain took first rank among the colonizing powers of Europe. But the Spaniards never really attempted to develop the industrial resources of the subject countries. The pursuit of mining for gold or silver occupied the colonists almost exclusively, and the enslaved natives were driven to work themselves to death in the mines. Cities were founded, at first along the coasts, for the sake of commerce and as military posts, and afterwards in the interior. The colonial intercourse with Spain was confined to the single port of Seville, afterward to that of Cadiz. When the power of Spain declined, that country lost most of its colonies. At the close of the Spanish-American War the Philippines and Porto Rico were ceded to the United States and Cuba became an independent republic—The Ladrone Islands were sold to Germany in June, 1899, and Spain now owns only a few small places in India and Africa.

Dutch Colonies. The ill-will of Philip II, who excluded Dutch vessels from the port of Lisbon, forced the Dutch to import directly from India or lose the large carrying trade they had acquired. Several companies were soon formed, and in 1602 they were united into one, the Dutch East India Company, with a monopoly of the East India trade and sovereign powers over all conquests and colonies in India. The Dutch rapidly deprived the Portuguese of nearly all their East Indian territories, settled a colony at the Cape of Good Hope (1650), established a West India Company, made extensive con-

quests in Brazil (1623-1660), which were soon lost, and more permanent ones on some of the smaller West India islands. The growing power of the British and the loss of Holland's independence during the Napoleonic wars were heavy blows to the colonial power of the nation. But the Dutch still possess numerous colonies in the East Indies, among which the more important are Java, Sumatra, Dutch Borneo, the Molucca Islands and part of New Guinea; they also possess several small islands in the West Indies, and Surinam.

British Colonies. No other colonizing power of Europe has had a career of such uniform prosperity as Great Britain. The English attempts at colonization began nearly at the same time as the Dutch. After many fruitless attempts to find a northeast or northwest passage to the East Indies, English vessels found their way round the Cape of Good Hope to the East Indies in 1591. The East India Company was established in 1600. The ruin of the Mogul Empire in India after the death of Aurengzebe (1707) afforded the opportunity for the growth of British power, as the British and French were compelled to interfere in the quarrels of the native princes and governors. By the victory of Clive at Plassey in 1756, France was practically driven from India, and England laid the foundation of an exclusive sovereignty there. By the middle of the nineteenth century the British territory embraced nearly the whole of India, which was still under the government of the East India Company—a mercantile company, controlled, indeed, by Parliament, but exercising many of the most important functions of an independent sovereignty. On the suppression of the Indian mutiny (1857-1858) the government of India was transferred to the Crown by act of Parliament in 1858.

The discoveries of the Cabots, following soon after the voyages of Columbus, gave the English Crown a claim to North America, which in the reign of Elizabeth led to colonization on a large scale. Raleigh's settlement on Roanoke Island (North Carolina) in 1585 failed to become permanent, but in 1607 the colonists sent out by the London Company to Chesapeake Bay founded Jamestown in Virginia. The next great settlement was that of the Pilgrim Fathers, who landed December 21, 1620, in Massachusetts Bay. The colonization of New

Hampshire, Maine, New Jersey, Connecticut, Rhode Island, Maryland, Pennsylvania, the Carolinas and Georgia followed within a century, and, meanwhile, New Amsterdam was seized from the Dutch, and its name was changed to New York. Colonies were early established in the West India islands; Newfoundland was taken possession of in 1583 and colonized in 1621; Canada was surrendered to Britain by the Treaty of Paris in 1763. In 1764 began the disputes between Great Britain and its North American colonies, which terminated with the independence of the United States, Canada still remaining a British dependency, but now is a Commonwealth of the Empire.

Australia was discovered in the beginning of the seventeenth century. The first settlements of Britain there were penal colonies, the first being established in New South Wales about 1770. In 1851 the discovery of the abundance of gold in Victoria gave a great impetus to the prosperity of the Australian colonies. Australia is now a Commonwealth, entirely self-governing, but an important part of the British Empire. In 1874 the Fiji Islands, and in 1884 part of New Guinea, were annexed as crown colonies. In South Africa, Cape Colony, first settled by the Dutch in 1652, became an English colony in 1814, and English influence there has since been steadily expanding, now extending over a large part of South, East and North Africa. In Europe Great Britain has a few colonies acquired for military reasons—Gibraltar in 1704, Malta and Cyprus in 1914. It is estimated that the existing British colonies and dependencies embrace about one-sixth of the land surface of the globe and about one-fifth of its population.

French Colonies. *France* was somewhat late in establishing colonies. Champlain was the pioneer of the French in the exploration of the North American continent and founded Quebec in 1608. Colbert purchased several West India islands, as Martinique, Guadeloupe, Saint Lucia, and sent out colonists in 1664 to Cayenne. In 1670 the East India Company, formed by Colbert, founded Pondicherry, which became the capital of extensive possessions in the East Indies. At the beginning of the eighteenth century *France* had settlements in Canada, Nova Scotia and Newfoundland and the most flourishing of the West India islands, and the country seemed to have a

prosperous career before it in India. Before long, however, the rival interests of British and French colonists brought about a conflict, which terminated in the loss of Canada and other North American possessions, as well as many of the West India islands and a large part of India. *France* has colonial possessions at present in India, Cochinchina and southeastern Asia, New Caledonia, and other islands in Oceania, in Africa and in the West Indies.

Other Colonies. Within recent years *Germany* made an effort to take rank as a colonial power, and it acquired territories in Africa and in the islands of the Pacific, as well as posts in China. All these were taken from that country in the early part of the World War by the British, Japanese and Australians. *Denmark's* northern dependencies, Greenland and the Faroe Islands, though of considerable extent, are of small value; Iceland is practically independent. In the West India islands Denmark had Saint Thomas, Saint Croix and Saint John until 1917, when the Danish West Indies were sold to the United States, and renamed Virgin Islands.

Since the late nineteenth century the *United States* has taken rank as a colonizing power, having gained in 1898, by the Spanish-American War, the island of Porto Rico in the Caribbean Sea and the Philippines in the Pacific; the same year the Hawaiian Islands were acquired by annexation, and since that time other small islands have been added. The latest acquisition is the Virgin Islands. The Philippines will be independent in 1945.

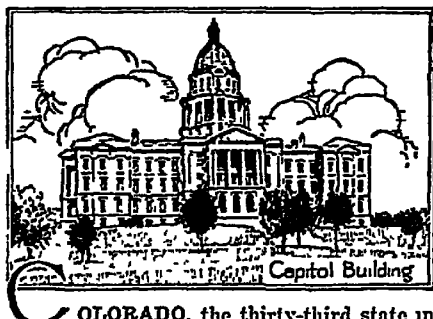
Related Articles. For further details see, in the articles on the countries mentioned, the subhead Colonies

COLOR, *ku'ur*, the name used to distinguish the different sensations that lights produced by various rates of vibration give to the eye. White is composed of seven colors, violet, indigo, blue, green, yellow, orange and red. These are known as the *prismatic* colors (see **LIGHT**, subhead *Spectrum*), and all other colors are produced by combinations or modifications of the prismatic colors. The color of bodies is due to their different powers of reflecting light. A red body reflects the red rays and absorbs all the others; a blue body reflects only the blue rays; a green body, the green, and so on.

The *primary* colors are those from which

all other colors can be made by mixing. They are blue, yellow and red. The remaining prismatic colors are known as *secondary*, because they can be produced by mixing two of the primary colors, as blue and yellow produce green; red and yellow, orange, and blue and red, violet or indigo, according to the quantity of red used. *Complementary* colors are those which, when mixed, produce white, any one of the primary colors is a complementary color when mixed with the other two.

In the scientific sense of the word, white and black are not considered colors. A white body reflects all the rays, and the black body absorbs all without separating them. This, however, is only theoretical. In all cases some rays are absorbed and some reflected.



COLORADO, the thirty-third state in the Union in respect to population. It was admitted August 1, 1876, and consequently is known as the **CENTENNIAL STATE**. Many persons think of Colorado as belonging to the far west, although the eastern boundary of the state is only 200 miles west of the geographical center of the United States. Colorado is about the size of Italy, is larger than Great Britain and is nearly twice as large as the combined area of the New England states. Its area is 103,948 square miles; it is about 380 miles long and 280 miles wide. The census of 1930 gives the population as 1,035,791, indicating an increase of about 1,000 per year for the preceding 10 years.

Surface and Drainage The surface of Colorado is naturally divided into three parts. The eastern part consists of the great plains extending from the eastern boundary to the foothills of the Rocky Mountains. These plains vary in height from 4,000 to 6,000 feet. Through the west-central part of the state run the Rocky Mountains with their

lofty peaks, great parks and the Continental Divide. The western part is a rugged plateau nearly all of which is a mile or more above sea level.

Colorado is famous for the large number of her lofty peaks and the grandeur of her mountain scenery; there are within the state more than 333 peaks with an altitude of over 10,000 feet and more than 30 of them are 14,000 or more feet high. Mt. Massive and Mt. Elbert are the two highest, each being 14,420 feet above sea level. They are surpassed by two peaks in Alaska and two in California and by no others in the United States. Pikes Peak (14,108) is the most celebrated, its summit is reached not only by a mountain railroad but also by one of the most wonderful automobile roads in the world.

Between the various ranges of mountains and their towering peaks is included that part of the state known as the Rocky Mountain Parks. These consist of open grass land which is generally level or undulating, the common idea of a park with trees does not apply. The altitude varies from 7,800 to 9,200 feet. San Luis Park is larger than Massachusetts. North Park is the smallest, but it is nearly as large as Rhode Island.

In the mountainous part of the state the rivers are usually rushing torrents, pouring their waters down from the melting snow of the many lofty peaks. The principal rivers are the South Platte, the Arkansas, the Rio Grande, the Colorado, the Yampa, the White, the Green, the Gunnison, and the Uncompahgre. On the great Continental Divide rivers whose waters reach the Atlantic Ocean and rivers whose waters reach the Pacific often have their sources within a mile or so of each other.

Climate. Reports concerning Colorado climate are very confusing to Eastern people. This is due to varying elevations, to the presence or absence of moisture in the different parts of the state, and to the remoteness or proximity to high mountains. The United States authorities divide Colorado into five zones of temperatures. In these zones the annual average temperature varies from 35° or less in the high altitude to 50° or higher in the Arkansas valley and in the protected valleys of the mountains.

The climate is healthful, dry, and invigorating. In all parts of the state there is an abundance of sunshine, in an average year there are at least 300 clear days. Fog

in Colorado only occurs about once a year in the western part of the state, about three times a year in the eastern foothills, and somewhat more frequently in the eastern portion of the state. The summer sun is frequently very hot, but prostration from heat is practically unknown.

Mineral Resources. From the time of the Louisiana Purchase various reports were made concerning the discovery of gold in the Rockies, but no definite operations were undertaken until 1858. During the first half century of its history the leading industry of Colorado was mining some of the precious metals. In later years production amounted to as much as \$5,000,000 in a year; the yield was gold, 242,008 ounces; silver, 2,242,646 ounces; copper, 10,000,000 pounds; lead, 4,500,000 pounds, zinc, 2,491,000 pounds. Other minerals mined in later years are molybdenum, tungsten, manganese, fluorspar and other minerals used in the manufacture of war materials. In one year the production of radium was valued at \$2,500,000. The coal deposits are extraordinary; the value of the mined product embracing every variety of coal is often \$10,000,000. Coal mines are found in 16 counties. Oil and gas are very important industries. The mineral springs have attracted a good deal of attention. The mineral by-products include sandstone, limestone, clay and pyrite.

Agriculture. Colorado has approximately 60,000 farms; on these farms 8,500,000 acres are devoted to crops. Over half of the acreage is under irrigation. Dry-farming has greatly increased farm development. The variety of agricultural products is practically unlimited. In one year the value of leading crops was as follows: hay, \$12,700,000; corn, \$7,500,000; potatoes, \$6,284,000; wheat, \$3,455,000; barley, \$2,000,000; oats, \$1,160,000. In the production of sugar beets Colorado leads with an output of 2,624,000 tons. Fruit may be produced in almost any locality having an altitude of less than 6,000 feet, but the western slope leads in production, especially in peaches and apples. Gross income from crops has reached \$21,400,000 in one year. Stock-raising has flourished; the farms of Colorado support 1,526,000 cattle and 318,000 horses. The wool clip amounts to 12,489,000 pounds.

Manufactures. Nearly 14,000 factories produce goods worth \$183,500,000 in one year. Sugar, flour, meat-packing, canning,

manufacture of iron and steel products, stoves, cars and car wheels, rubber goods, automobile supplies, leather, soap, brick and pottery are among the industries of the state.

All the conditions in Colorado combine to insure a great future in the manufacturing industries of Colorado. It has an unlimited supply of coal, all forms of building material are here, and the possible supply of electric power by utilizing the mountain rivers is almost unlimited. On the other side of the Front Range the Grand River has been turned for several miles through a tunnel in the mountains; this gives an enormous waterfall which will produce great electrical power for all time to come. Denver receives its electric supply from this equipment.

Railroads. The first railroad in Colorado was the Union Pacific, built from Denver to Cheyenne in 1870. The steam roads cover 5,262 miles and the electric lines 227 miles. The mountain railroads extend through the most beautiful scenery; their construction is an exhibition of the greatest modern engineering skill. Nearly 10,000 miles of public highways are maintained, with about half of the mileage surfaced. There are 10 principal bus routes available. Colorado has more than 32 airports and landing fields.

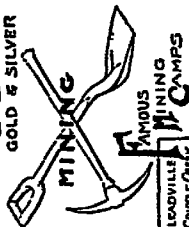
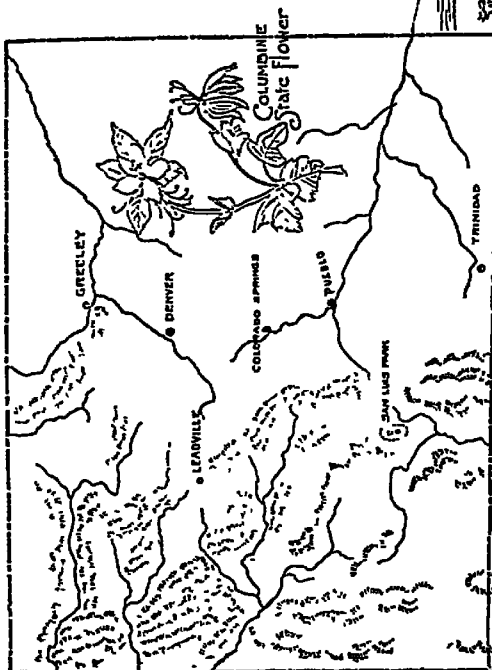
Government and Education. The government is similar to that of most of the western states. The members of the senate are elected for four years and those of the house of representatives for two years. The governor is elected every two years. A supreme court consists of the chief justice and seven associate justices. In 1912 a constitutional amendment was adopted providing for the recall of all elective offices. Colorado in 1893 was the second state to grant woman suffrage. Denver is the capital.

The University of Denver is the pioneer institution of higher learning in the state, it was founded as Colorado Seminary in 1864. Other institutions are the State University at Boulder, the School of Mines at Golden, the Agricultural College at Fort Collins, Colorado College, Colorado Springs, Loretto Heights College, Loretto; Regis College for Men, Cliff School of Theology, Westminster Law School, all three at Denver; the teachers colleges are at Alamosa, Greeley and Gunnison, with a normal school at Denver. There are also 4 junior colleges.

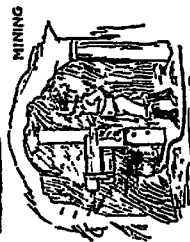
Institutions. The state hospital for the insane is at Pueblo and the soldiers' and

COLORADO

"CENTENNIAL STATE"



FAMOUS MINING CAMPS
 Leadville
 Cripple Creek
 Canon City
 Victor



ON THE PLAINS

PIKES PEAK

ROYAL GORGE

CAPE PALACE

Items of Interest on Colorado

The greatest mountain "parks"—North, South, Estes and San Luis—form a remarkable feature of the state; these are great plateaus, partly level meadows, partly forests, partly mountainous, lying east of the Continental Divide; Middle Park is west of it.

The timber line on the mountains is about 10,000 feet above the sea; the snow line falls at about 11,000 feet.

Large game is still abundant west of the Continental Divide and in the great parks, deer, elk and antelope, grizzly, brown and black bears are the most common.

There are about 12,000 miles of irrigation canals, which water nearly three-fourths of the improved farm lands.

Cripple Creek mining district is one of the most interesting areas on account of the diggings in the volcanic crater.

The trees of Colorado may be easily grouped into five classes according to the altitude where they grow in largest numbers.

Questions on Colorado

What is the area of Colorado?

What are the three great physical divisions?

What are some of the best-known mountain peaks?

What are the "parks"?

Name four large rivers which have their sources in the state.

What can you say of the climate?

What large game is still abundant?

How does Colorado rank as a producer of beet sugar?

What are the principal mineral deposits?

What manufacturing industries are most important?

How many miles of railway are there in the state?

When were women granted the suffrage?

What agricultural products does Colorado afford?

What kinds of natural wonders are observed by the tourist?

sailors' home and the reformatory are at Monte Vista. The state prison is maintained at Canyon City while the industrial school for boys is at Golden and a similar school for girls is at Morrison.

Points of Interest. The eyes of the traveler are directed to the Garden of the Gods, Cave of the Winds, Seven Falls, Pikes Peak, Mt. Manitou Scenic Incline, the Ancient Cliff Dwellings, Rocky Mountain National Park with its 254,327 acres, Grand Lake at an altitude of 8,369 feet, Grand Mesa Forest, with its 700,000 acres, and the Mount of the Holy Cross, with the 111 lakes near it. The magnificent canyons are the canyon of the Grand River, the Black Canyon of the Gunnison and the Royal Gorge of the Arkansas River.

The great variety of climate has made the state an attractive habitat for an exceptionally large number and variety of wild birds.

History. The name of the state, taken from that of the Colorado River, signifies *red*. The country was visited by Spanish adventurers in the sixteenth century, but was not settled. By the Louisiana Purchase the United States gained possession of about half of the territory of Colorado and the remainder was acquired from Mexico by the Treaty of Guadalupe-Hidalgo. It was explored by Zebulon Pike in 1806 and by Fremont in 1843. The discovery of gold in 1858 was followed by settlement in the regions of the mines, and Denver and Boulder were established. In 1861 the territory Colorado was organized from portions of Kansas, Nebraska, New Mexico and Utah, and after two acts for its admission as a state had been vetoed, it finally was admitted in 1876. Needs of the day have been met through modern legislation by which the state government has been reorganized and a new building and loan code has been formulated. The penalty for kidnapping has been fixed at life imprisonment. Laws have been passed establishing old age pensions, prohibiting the distribution of prison made goods, regulating the sale of intoxicating liquors, and suspending former anti-trust and "unfair competition" laws.

Related Articles. Consult the following titles for additional information

Boulder	Greeley
Colorado Springs	Parks, National
Cripple Creek	Pike's Peak
Denver	Pueblo
Fort Collins	Royal Gorge
Garden of the Gods	Trinidad

COLORADO, UNIVERSITY OF, an institution of higher learning at Boulder, incorporated by the territorial legislature in 1861. In 1876 the constitution of Colorado provided for its erection as a state university. It maintains colleges of arts and science, engineering, pharmacy, and music; schools of medicine, law, business and a graduate school. There is a summer session and a division for extension work. There is a faculty of over 300 and a student enrolment normally of about 3,500. The libraries contain over 330,000 volumes.

COLORADO RIVER, until 1921 considered as formed by the junction of the Grand and Green rivers, but in the year named Congress declared the Grand to be a continuation of the main river and the Green a tributary. Among the most wonderful natural objects in the world is the Grand Canyon of the Colorado in Arizona. The river flows south-west and south through Utah into Arizona, forming the boundary between Arizona on one side and Nevada and California on the other. After a course of about two thousand miles from the source of the Green River it empties into the Gulf of California. By agreement of the state, drained by the Colorado River the great Boulder Dam has been constructed in the Black Canyon, for the purpose of supplying irrigation and hydroelectric power. See **GRAND CANYON OF THE COLORADO; IRRIGATION**.

COLORADO RIVER, a river of Texas, rising in the northwestern part of the state. It flows in a southeasterly direction through the state and empties into the Gulf of Mexico, through Matagorda Bay. The chief towns on its banks are Bay City, Austin, La Grange and Bastrop. It is 650 miles long and is navigable up to Austin, a distance of 200 miles. The river provides valuable power, and its waters are used in irrigating the districts in its valley.

COLORADO SPRINGS, Colo., founded in 1871 and now third in size among the cities of the state, is seventy-five miles south of Denver and forty-three miles north of Pueblo. It is on the Denver & Rio Grande, the Atchison, Topeka & Santa Fé, the Missouri Pacific, the Colorado & Southern, and the Chicago, Rock Island & Pacific railroads. The beautiful scenery and healthful climate of the vicinity has made this section one of America's most popular pleasure and health resorts. Some of the

parks are world famous, particularly the Garden of the Gods (which see), containing 480 acres; other parks are North Cheyenne Canyon (300 acres), Monument Valley Park (200 acres) and Cheyenne Mountain Zoo.

The important industries are gold reduction mills, coal mining, the manufacture of advertising films, and the making of dandy products. The city is governed on the mayor-council plan, with a city manager. The important buildings include Grace Church, Stone Chapel, and a city auditorium. The Union Printers' Home, founded by George W. Childs (which see) is valued at \$1,000,000; the Modern Woodmen of America's sanitarium was established in 1909 at a cost of about \$1,000,000. Colorado College and the state school for the deaf and blind are in the city. There are several large hotels, numerous hospitals, and a large number of costly residences. Colorado City was annexed in 1917. Population, 1920, 30,105; in 1930, 33,237, a gain of 10.4 per cent.

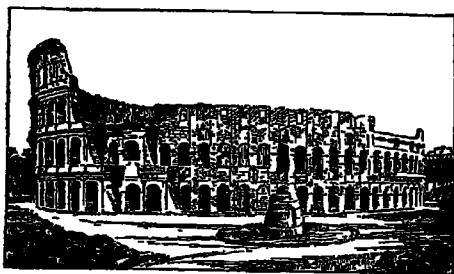
COLOR BLINDNESS, an optical defect which prevents the recognition of certain colors. It is incurable, may be partial or complete, and may affect one or both eyes. While this defect is sometimes suffered by persons whose vision is otherwise normal, irregular refraction very commonly accompanies color blindness. The most common forms are known as *green blindness*, in which the affected eye fails to recognize green, that color usually appearing as yellow, and *red blindness*, in which the eye cannot recognize red but sees it as a bright yellow or a pale yellow. Some eyes are so defective that they fail to recognize three colors, while occasionally one is found who can recognize only black and white. Color blindness may be in-born or acquired.

The continual straining of the eye in observing objects at long distances sometimes produces color blindness of the objects continually looked for, as in the case of trainmen on railways who have followed the road for a long time. These men frequently become color blind to red and green. In some states people who are color blind may not drive automobiles.

COLOSSEUM, *Colosseum*, a name given to the **FLAVIAN AMPHITHEATRE** in Rome, a large edifice for gladiatorial combats, fights of wild beasts and similar sports. It was begun by Vespasian and finished by Titus, A. D. 80. The outline of the Colosseum is

elliptic, the exterior length of the building being 620 feet, its breadth, 513 feet, and its height, 157 feet. It is said to have seated 87,000 people and to have had standing room for 20,000 more. The arena, or central space, measured 280 by 176 feet and was enclosed by a low wall, a protection against the wild beasts. The flooring was boards covered with red sand to soak up blood. Underneath were rooms for men and animals.

The exterior of the building was decorated by three rows of columns, the first story with Doric, the next with Ionic and the third with Corinthian columns. Down to the sixth cen-



THE COLOSSEUM

"While stands the Colosseum, Rome shall stand, when falls the Colosseum, Rome shall fall, and when Rome falls—the world"

tury this imposing building remained almost uninjured, but at that time Theodoric, king of the Goths, had material taken from it for the construction of various buildings. The ruins today show four stories on one side only. The name is derived from the colossal statue of Nero, which for several centuries stood close by.

COLOSSUS, *ko los'us*, in sculpture, the name for any statue of very large size. The Egyptians produced many excellent examples of colossal statuary. Among these the most celebrated were those of Amenophis III, one of which was the so-called *Memnon*, whose vocal powers were fabled as one of the wonders of ancient times. The Greeks produced the most artistic colossi, among which were the bronze statue of Pallas Athene, on the Acropolis of Athens; the statue of Athene of gold and ivory, in the Parthenon at Athens, and the Olympian Zeus, sculptured by Phidias. One of the seven wonders of the world was the *Colossus of Rhodes*, representing Helios, the sun god. It stood astride the entrance of the harbor of Rhodes, a bronze figure probably ninety feet

high. The Romans followed the Greeks in this form of art and produced such colossi as the statue of Jupiter, on the Capitol, and that of Nero, 110 feet high, from which the near-by amphitheater derived its name of *Colosseum*. Among modern works of this nature are the *Germania* at Niederwald, on the Rhine; the statue of Peter the Great, at Petrograd, and the statue of *Liberty Enlightening the World*, New York (see *LIBERTY, STATUE OF*).

COLUMBIA, Mo., founded in 1821, is the county seat of Boone County, 144 miles west of Saint Louis, on the Wabash railroad and on a branch of the Missouri, Kansas & Texas system. There is a well-equipped local airport. The city is situated in a farming, fruit-growing and stock-raising district, and manufactures agricultural implements. The state university, the Missouri State College of Agriculture, Christian College, Stephens College, and a coaching school for West Point and Annapolis are located here. Because of its educational importance the city is called the "Athens of Missouri." Columbia has a Memorial Tower in honor of war dead, three hospitals, two golf courses, state hospital, an agricultural experiment station and a weather bureau office. Population, 1930, 14,967.

COLUMBIA, PA., a city in Lancaster County, twenty-eight miles southeast of Harrisburg, on the Pennsylvania and the Philadelphia & Reading railroads and on the Susquehanna River. It is an important industrial center and manufactures stoves, castings, laundry machinery, silk goods, lace, dresses, and pretzels. Columbia was settled in 1726 by Quakers, and was known for many years as Wright's Ferry. It has two Catholic schools. Population, 1920, 10,836, in 1930, 11,349.

COLUMBIA, S. C., the capital of the state and its second city in size, and the county seat of Richland County, eighty-two miles northeast of Augusta, Ga., and 130 miles northwest of Charleston, on the Seaboard Air Line, the Southern, the Atlantic Coast Line and the Columbia, Newberry & Laurens railroads, and on the Congaree River. The city is in a cotton region, near extensive forests, and a canal from the river furnishes water power. The manufacturing of cotton products is the chief industry, there being six cotton mills; there are also four oil mills and three fertilizer plants. In

all, there are not far from 170 manufacturing establishments. The courthouse, the city hall, the statehouse, a Federal building costing \$265,000, and Y. M. C. A. and Y. W. C. A. buildings are noteworthy. There are business blocks of ten, twelve and fifteen stories in height. Columbia is the seat of the University of South Carolina, the Presbyterian Theological Seminary, the Columbia Female College (Methodist), the College for Women (Presbyterian), and Allen University and Benedict College, both for colored students. There are eight parks, three golf courses, and an airport.

It was settled about 1700 and remained small until the capital was moved here from Charleston in 1786. During the Civil War Sherman entered the city, February 17, 1865, and the following night three-fifths of the place was destroyed by fire. The city recovered rapidly after the war, and its recent development is a part of the general revival in the South. The commission form of government is in operation. Population, 1920, 37,524; in 1930, 51,581, a gain of 37.5 per cent.

COLUMBIA RIVER, one of the most important rivers in the United States, rising in the Rocky Mountains in British Columbia, flowing in winding course, chiefly through the United States, into the Pacific Ocean. Near its mouth it forms the boundary between Washington and Oregon. The salmon fisheries of this river are famous, and are the source of great wealth. The river is also noted for its beautiful scenery. Its chief tributaries are Clark Fork, the Spokane River and the Snake River. The Columbia River Highway (which see) a scenic road, has made the beauties of the Columbia familiar to thousands of visitors. The river is about 1,400 miles long, and it drains an area of 259,000 square miles.

COLUMBIA RIVER HIGHWAY, a wonderful paved highway extending 500 miles along the mighty Columbia River, west from Portland, Oregon, to Seaside on the Pacific Ocean and east from Portland to Pendleton discloses to the traveler some of the most awe-inspiring and majestic scenery in the world. Its beauty is a combination of the wonders of the Alps, the Rhine, and Southern Italy with the wild grandeur of the American Rockies. The construction of the roadway, completed in 1916, was, in itself, a remarkable engineering accomplishment. The

building of the Columbia Highway opened to view the great wonders of the Columbia Gorge and in ten miles of travel eleven beautiful water falls are passed. The total cost of the road was more than \$12,000,000.

COLUMBIA UNIVERSITY, in New York City, is one of the oldest educational institutions in the United States, and one of the largest in the world in enrolment.

The university traces its origin to King's College, a charter to which was granted by the British Crown in 1754. Ministers of five different denominations were named as governors of the college. The name was changed to Columbia College in 1784, in 1896 the name became Columbia University.

The university organization includes the schools of law, postgraduate medicine, applied science, mines, chemistry, architecture, journalism, business, dentistry, library science; graduate schools of political science, philosophy, pure science; colleges of engineering, pharmacy, a teachers' college, a college of physicians and surgeons, Columbia College (undergraduate school for men), Barnard College (for women), Seth Low



WILD COLUMBINE

Junior College; close relations are maintained with Union Theological Seminary.

The sixty-five buildings of the university are grouped along Morningside Heights,

overlooking Riverside Drive and the Hudson River; but the medical and pharmacy schools are conducted in quarters elsewhere. Columbia University Press, the extension courses, and the large home study department exert a wide influence beyond the limits of the campus. A building each is provided for students with French, or Italian, or German interests. The university also conducts research projects of outstanding importance.

The total financial resources of the university exceed \$152,000,000; of this amount \$57,800,000 is invested in buildings and grounds. The university libraries contain 1,500,000 volumes. The teaching staff numbers about 2,900. The annual registration of resident students is nearly 28,000.

COLUMBINE, the popular name of plants with five colored sepals and five spurred petals. The common columbine is a favorite garden flower and owes its name to the fancied resemblance of the petals to the form of doves, *columba* being the Latin word for *dove*. The columbine is the state flower of Colorado. In the United States several species grow wild and are known commonly, but erroneously, as honeysuckles.



COLUMBUS, CHRISTOPHER (1451-1506), the discoverer of America, whose first expedition to the New World, in 1492, marks the beginning of the modern era, and was an event of inestimable importance in the world's history. Columbus made his discoveries under the Spanish flag, but he was a native of Italy, and was born in or near Genoa. The correct form of his name is Christoforo Colombo. He was carefully educated and early in life he developed a taste for

adventure and a desire for geographical knowledge. About 1470 he came into possession of maps and papers which confirmed his opinion that the continent of Asia could be reached by sailing westward. Already he had become acquainted with the principles of navigation and had had considerable experience as a seaman, on voyages to England, the Canaries, Guinea and perhaps Iceland. For years he worked un-

ceasingly to gain financial support for his enterprise. He first went to wealthy individuals in Genoa, Venice and Lisbon, and then unsuccessfully implored the aid of King John of Portugal. He finally went to Spain, and for five years followed the court from place to place, pleading his cause at every opportunity.



CHRISTOPHER COLUMBUS

From a bust by an unknown sculptor, Capitoline Museum, Rome.

When almost disheartened by his many reverses, he stopped at a convent, La Rabida, where he accidentally met a well-known mariner, whose interest was at once aroused. A messenger was dispatched to the Spanish court, then encamped before Granada. The mission was successful, owing, probably to the brilliant termination of the war against the Moors, which ended in the fall of their great stronghold, Granada. By the aid of Ferdinand and Isabella, king and queen of Spain, he was enabled to start on a voyage to prove his theories, and on August 3, 1492, his small fleet—the *Niña*, the *Pinta* and the *Santa Maria*—set sail into an unknown sea.

The modern traveler, crossing the Atlantic in a week or so, and enjoying the comforts of the finest hotel, can little appreciate the perils of that voyage. Even more terrifying than the actual dangers of wind and wave were the superstitious fears of the sailors, for in those days the unknown seas were believed to be the abode of dreadful mon-

COLUMBUS

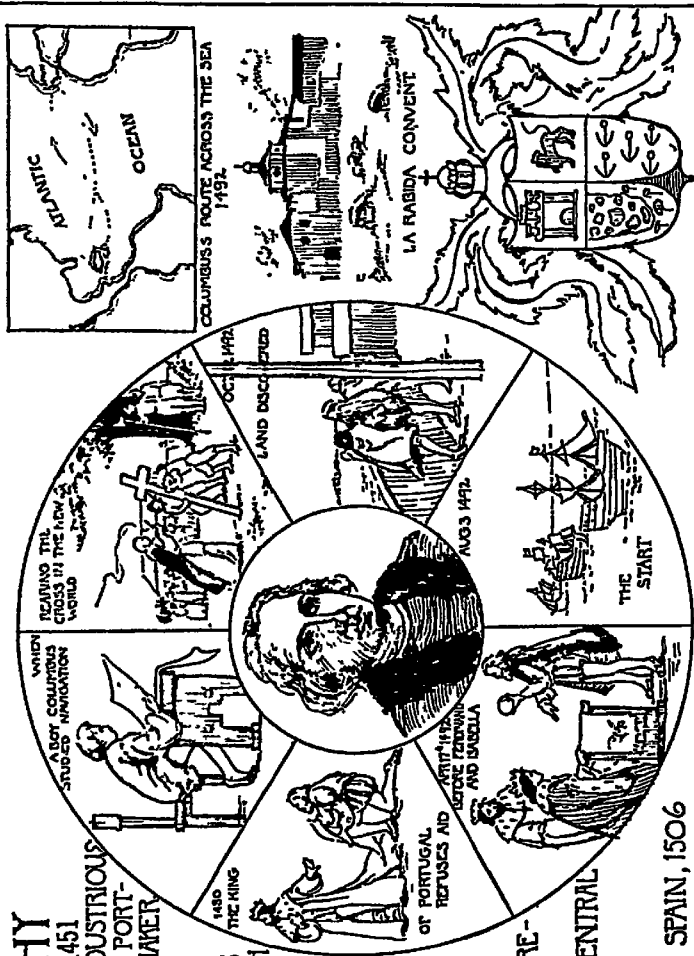
BIOGRAPHY

BORN: GENOA, ITALY, 1451
 PARENTS POOR BUT INDUSTRIOUS
 EARLY LIFE: SAILOR ON PORTUGUESE SHIP, MAP MAKER
 CHARTOGRAPHER FOR COURT OF SPAIN
 LATER LIFE: ADVOCATES ROTUNDITY OF THE EARTH
 MEETS MARCHENA AT CONVENT OF LA RABIDA
 RECEIVES AID FROM QUEEN ISABELLA

VOYAGES

1-1492, SAN SALVADOR
 2-1493, SAN DOMINGO
 3-1498, COAST OF SOUTH AMERICA
 RE-TURNED IN CHAINS.
 4-1502, COAST OF CENTRAL AMERICA

DIED; VALLADOLID, SPAIN, 1506

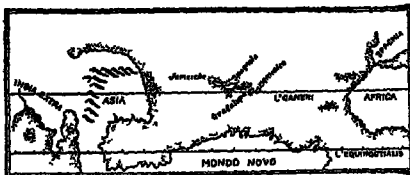


sters. Joaquin Miller has given us a suggestion of this in his inspiring poem, *Columbus*:

They sailed, and sailed, as winds might blow,
Until at last the blanch'd mate said,
"Why, now, not even God would know
Should I and all my men fall dead
These very winds forget their way,
For God from these dread seas is gone.
Now speak, brave Admiral, and say—"
He said: "Sail on! and on!"

After weeks of suspense the little band sighted land, and on October 12 they landed on one of the Bahama Islands, which Columbus called San Salvador. On October 28 he reached Cuba, which he thought was a part of Asia, and on December 6 he landed on Hayti (called Española, or Little Spain). Believing that he had reached Japan, Columbus established a colony there, and named it La Navidad. In January, 1493, he sailed back to Spain to receive the praise of people and monarchs alike.

Three other voyages followed the first, on the third of which he discovered a number of islands and the mainland of South America. His colonization schemes in Española, however, did not turn out well, and he had,



MAP OF THE WORLD

Made by Bartholemew Columbus, brother of Christopher, in 1502

moreover, become an object of envy and the victim of petty intrigue. In fact, he was sent home in chains on the third expedition, but was released through the intervention of Ferdinand and Isabella.

In 1502 he undertook his fourth and last voyage, during which he sailed along the coast of Central America. An attempt to found a colony there ended in failure, and at Jamaica the ship proved unseaworthy. After waiting many weary months for help, the Admiral and his crew were taken to Spain in a vessel sent from Santo Domingo, Hayti. At home Columbus met with a disappointing reception, for the queen had died and the king had lost interest in him and his colonization plans. On May 20, 1506, he died at

Valladolid, ignorant alike of the import of his discoveries, and of the fact that his name would be held in highest honor in the centuries to come. His body was interred in a monastery in Seville, but in 1642 it was removed, with that of his son Diego, to the cathedral at Santo Domingo. In 1796 the bodies were taken to Havana, but in 1898, when Cuba was lost to Spain, they were restored to their original resting places in Seville.

COLUMBUS, GA., the county seat of Muscogee County, on the left bank of the Chattahoochee River 100 miles south of Atlanta. It is on the Georgia Central, and the Southern railroads. The principal industries are eleven large cotton mills, cotton gins and iron works. There is a Federal building, a large hotel built by 300 citizens, a Carnegie Library and a city hospital. The export trade in cotton is extensive. Population, 1920, 31,126; in 1930, 43,131, a gain of 38.6 per cent.

COLUMBUS, OHIO, founded in 1812 and since that time the capital of the state, is the third in size among Ohio cities and is the county seat of Franklin County. The city is 124 miles southeast of Toledo, 138 miles southwest of Cleveland and 116 miles northwest of Cincinnati.

The first railroad to reach Columbus was the Columbus & Xenia, built in 1849. The Norfolk & Western, the Pennsylvania, the New York Central, the Baltimore & Ohio and the Chesapeake & Ohio railways, with branch lines, now serve the city. One electric line and numerous motor bus lines operate out of Columbus. The Columbus airport and the municipal airport bring to the city many transcontinental planes and travelers and Columbus is in fact a focal point for east and west airways south of Cleveland. Ten air mail planes arrive and leave and 146 passenger trains leave daily.

The state capital is situated in the center of the city. From it High Street, the main business thoroughfare, runs north and south. It is intersected at Capitol Square by Broad Street, which is 120 feet wide and which affords sites for many fine churches, public buildings and residences. The Columbus Civic Center, one of the most beautiful in the world, is the district which contains the far-famed American Insurance Union Citadel, the Y. M. C. A. building, the city administration building, the Ohio State Office

building, the Federal building and post office, the Columbus auditorium and the central police building.

Education. Educational institutions are numerous and flourishing: the Ohio State University, Capital University, Saint Joseph's Academy, Saint Mary's of the Springs, the Columbus Art School, the Battelle Memorial Institute of Metallurgy, the Ohio State Archaeological and Historical Museum are most important. Pupils enrolled in the elementary and high schools number over 47,000.

State institutions for the insane, feeble-minded, deaf and dumb and for the blind are established in the city; in fact, it contains 52 public welfare institutions. There are 228 churches, and over 1,000 acres are devoted to playgrounds and parks.

Industry. Manufacturing industries rank as follows: iron and steel products, foods, leather products, paper and printing, vehicles and parts, textiles, stone, clay and glass, lumber products, chemicals, non-ferrous metal products, caskets and morticians' goods, book and job publishing. The annual output amounts to more than \$140,000,000 in value. Under normal conditions 10 per cent of all wage earners turn out 40,000 pairs of shoes daily; other industries also have made astonishing records.

This progress is due in no small measure to the extensive researches carried on in the field of industry. The Battelle Memorial Institute, operated without profit, specializes in metallurgy and fuel. Orton Memorial Laboratory and the ceramics department at the Ohio State University are noted for research in ceramics.

The city is governed by a mayor and council. Population, 1930, 290,564.

COLUMN, kol'um, in architecture, a pillar, generally cylindrical in form, made of wood, stone, iron or other material and used to support a weight or to serve as an ornament. Strictly speaking, a column consists of a *base*, on which it rests; a *shaft*, cylindrical in form, and a *capital*, the portion surmounting the shaft. The Egyptians very early began to use columns extensively, as may be seen in the ruins of their temples. A great variety of designs and forms were employed, some columns being plain, smooth cylinders, elaborately decorated; others, square or polygonal in shape, and others, resembling a bundle of palms or lotus stems bound together. All were massive and heavy in ap-

pearance. The Persian columns were generally tall and slender.

The Greek Orders. The Greeks developed the forms of columns to their highest perfection, and their designs became conventionalized into the so-called *three orders of architecture*, in which the styles of the base, shaft and capital conform to certain fixed rules.

The *Doric* order (Fig. 1) is the oldest and simplest, and it is most frequently seen among the remains of ancient Greek architecture. It is distinguished by its want of a base and by its plain capital. The shaft is about five diameters high and is fluted, the flutes being few in number and joined together. The capital has two parts, of equal thickness, the upper a square block or *plinth*, called the *abacus*, resting upon a circular tablet, or *echinus*. The *entablature* is the portion above the capital and consists of three parts, the *architrave*, or portion directly above the column; the middle, or *frieze*, which is the only part decorated in the Doric order, and the cornice, or upper part. The best example of the Doric order of architecture is the Parthenon at Athens.

The *Ionic* order (Fig. 2) was invented by the Asiatic Greeks and was far more graceful and decorative than the Doric, though not elaborate. The Ionic column is light and slender, the shaft being about eight times its diameter in length. The capital is higher than the Doric, is ornamented and connected with the architrave by a thin ornamented abacus. The shaft is fluted and the twenty-four flutes are separated by narrow flat surfaces. The Erechtheum, on the Acropolis at Athens, is a good example of the Ionic style.

The *Corinthian* order (Fig. 3), though invented by the Greeks, hardly attained the dignity of an order till Roman times. It is really an Ionic column with a more elaborate capital, adorned with beautifully carved acanthus leaves. The Choragic Monument of Lysicrates at Athens contains fine examples of Corinthian columns.

The Roman Orders. The Romans borrowed their styles of columns from the Greeks and added the *Tuscan* and the *Composite* orders, besides perfecting the Corinthian base and entablature. The *Tuscan* was a development of the Doric, being perfectly plain, with an unchanged base and pedestal, and was invented by the Etruscans and other

early Italian races. The *Composite*, also called the *Roman* or *Italic* order, combined the Ionic and Corinthian orders and was especially pleasing to the Romans on account of its rich ornamentation. The use of the arch among the Romans compelled the build-

COMANCHE, *ko man'che*, an Indian tribe, which formerly roamed through the region between Colorado and Mexico. The Comanche were excellent horsemen and extremely warlike, carrying on bitter warfare with the white people. About 1,000 of them

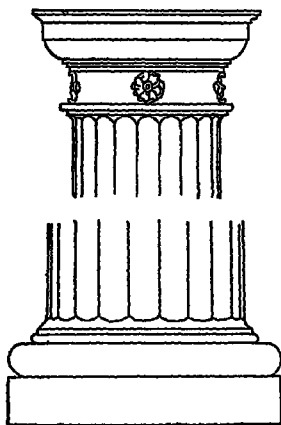


FIG 1

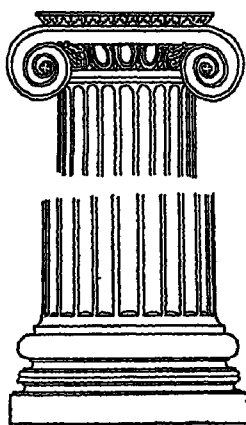


FIG. 2

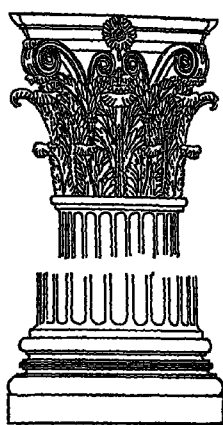


FIG. 3

ing of heavy piers to support the structure, as slender columns would have been too fragile, and thus the column came to be used merely for decorative purposes. Columns were often embedded in the masonry between the arches or attached to the faces of the piers and ornamented with beautiful designs.

Other Forms. Early Christian and medieval European architecture made free use of the column and introduced varied forms, especially in the shafts, which were often spiral, twisted or knotted, and were employed more often in groups or clusters than singly, chiefly as supports for arches. They were a feature of interior architecture, rather than exterior, as was the case with the Greeks. In modern architecture the column plays a subordinate part, both in decoration and usefulness.

Columns standing alone, unconnected with any building, have been erected at all times as monuments to commemorate important names and events, though they had at first only a religious significance. The Romans especially excelled in these monuments, the chief of which are the Column of Trajan and the Column of Antonine. See JULY, COLUMN or; TRAJAN'S COLUMN.

are now on a reservation in Western Oklahoma.

COMBUSTION, or **BURNING**, in the ordinary sense of the word, is the union of some substance with oxygen, the union producing light and heat; for example, when wood or paper burns there is a bright flame and considerable heat. The term may be used, however, to mean the chemical union of any two substances, so as to give heat and light. The amount of heat given out by burning substances depends on their chemical composition and on the way the elements are combined. Heat may be produced rapidly, as when phosphorus is burned in the air and a flame results, or it may be formed slowly, as when phosphorus slowly combines with oxygen and is said to oxidize slowly. The amount of heat produced in each case is the same, and both are said to be in a state of combustion.

The products of combustion in most cases are gases and some solid matter. In early times it was thought that when a substance burned it was destroyed; but when chemists were able to collect the gases that came off from a burning body and analyzed them, it was found that such was not the case.

Nothing is destroyed. The form is merely changed

Spontaneous combustion is accidental burning of a substance caused by the evolution of heat through chemical action within the elements comprising it.

COMEDY, *kom'edī*, a form of drama in which the subject matter is less serious and the treatment less dignified than in tragedy, and in which the outcome is happy. It is in general less exaggerated in its humor than the farce or the burlesque (see **DRAMA**). The following are some comedies that more modern writers have not equalled.

Man and Superman Shaw
The Little Minister Barrie
The Mind-the-Paint Girl Pinero
She Stoops to Conquer (1773) Goldsmith
The Rivals (1775) Sheridan
The School for Scandal (1777) Sheridan
Comedy of Errors (1594) Shakespeare
Merchant of Venice (1597) Shakespeare
Much Ado About Nothing (1597) Shakespeare
As You Like It (1599) Shakespeare
Twelfth Night (1602) Shakespeare
Rip Van Winkle (1866), Jefferson and Bouc-
cault.

COMENIUS, *ko mé'nus*, **JOHN AMOS** (1592-1671), a Moravian clergyman, ranking as the greatest educator of his day. He began his career as a teacher in the school of the Bohemian Brethren in Moravia, and afterwards became a preacher and assumed charge of a school in his parish. After the Thirty Years' War he settled in Poland and assumed the direction of a gymnasium. It was while holding this position that Comenius published his first great work, *The Gate of Tongues Unlocked*.

Comenius can justly be considered the originator of methods and principles in general use at the present day. He divided schools into four classes: the mother school, which was the home, the vernacular school, or the primary school; the Latin school, and the university. He believed in the study of the mother tongue, the various branches of natural science and natural history. He also advocated the development of the child's moral and spiritual nature along with his intellectual powers, and he believed in physical training and equal education for both sexes.

COMETS, *kom'ets*, heavenly bodies which move with incredible speed from or toward the sun, in remarkable orbits. The appearance of a comet is always a matter of intense interest in the regions of the earth

where it is visible, as few can be discerned by the naked eye. To the eye the comet appears to be composed of three parts: a star or bright spot, called the *nucleus*; a foggy mass surrounding this, called the *coma*, and the field of light, or *tail*, which follows the main comet. The tail is usually bright and narrow near the head, but it widens into a fan-shaped appendage farther from it. While the comet is approaching the sun, the tail trails behind, but as the comet goes away from the sun, the tail precedes it. The three parts are not always present, however, for sometimes a comet may seem like a thin cloud with a bright spot near the middle, or even like a small hairy mass.

Comets vary greatly in brilliancy, some being exceedingly bright, but only about thirty of such appear in a century. By means of the telescope new ones are continually being discovered. Some of these bodies travel around the sun in elliptical orbits; others appear from some unknown source, go toward the sun, pass around it and then depart on a line nearly parallel with the one on which they approached, while a third class, after going beyond the sun, leave it on a line which diverges from the one of their approach. It is evident that comets traveling in either of the last two orbits will never again approach the sun unless they are attracted from their respective courses.

No astronomer knows with certainty the exact composition of a comet or its origin; it is hard to tell what force has sent some of them from some other system, apparently, into this one of ours for a time, but the astronomers can predict the return of comets which have once appeared, if they are of the type that do return. It is supposed that the nucleus is composed of hard matter perhaps meteoric stones, and that the tail is gaseous, not necessarily itself in combustion, but perhaps bearing only reflected light of the sun. One comet at least has been known to divide into two and then to disappear, and it is thought that others are fading away. Of the comets that have been seen thus far, *Halley's comet*, which was discovered in 1682 and remained in sight for about a month, is the most important. Records show that it appeared in 1456, 1531 and 1607. It appeared again in 1759, 1835 and 1910. Upon observations of this comet

much of the modern theory is based. Other comets of importance are *Lexell's comet*, which was seen in 1770, but never reappeared; *Biela's comet* (1772, 1805, 1826, 1845), which later broke into two parts and then disappeared; and *Encke's comet* (1786). The last returns at irregular intervals of about three years. The most remarkable and brilliant of all was *Donati's comet*, which appeared in 1858. This will probably return in about the thirty-eighth century. In 1843 a very remarkable comet appeared, passing so near the sun that it probably went through the outer vapor of that body. In 1880 a similar comet appeared, apparently in the same orbit, and again in 1882, a third, to all appearances exactly similar to the two preceding. These are the first cases on record where several comets have been found in the same orbit, following one another in close succession.

COMIC OPERA, a form of operatic entertainment in which the subject matter is farcical and the music bright and melodious. The true comic opera, represented by the series produced by Gilbert and Sullivan, is a burlesque on the more serious form of opera. Among comic operas of genuine merit are *The Mikado*, *H. M. S. Pinafore* and *Pirates of Pensance*, by Gilbert and Sullivan; *Rob Roy* and *Robin Hood*, by Reginald De Koven; and *Babes in Toyland* and *Mlle. Modiste*, composed by Victor Herbert.

A modern and very popular variant of the real comic opera is the so-called musical comedy, in which a feeble story serves as a basis upon which to build a spectacular entertainment of music and buffoonery. Expensive costumes, gorgeous scenery and "catchy" music are considered essential to the success of these entertainments. Occasionally a musical comedy of superior merit is produced, such as *The Merry Widow*, *The Chocolate Soldier* and *Sari*. The distinction between a high-class musical comedy and comic opera is, however, not always easy to make. The French term *opéra comique* is applied to a dramatic composition which it set to music, but contains spoken dialogue and is often of a serious character. To this class belong Beethoven's *Fidelio* and Weber's *Der Freischütz*.

COMITIA, *ko mish'i ah*, the name given in ancient Rome to the meetings of the people in which state questions were voted upon. The *Comitia Curiata* was the oldest of the

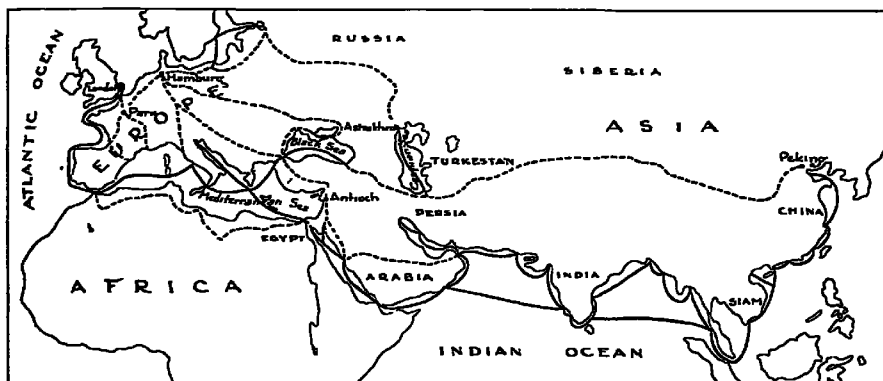
comitia and was made up of patricians only. For centuries, until the time when the plebeians grew strong in their demands for equal rights, the *Comitia Curiata* had the highest power in the state. Its importance grew less, however, as the *Comitia Centuriata* became more prominent. This second assembly admitted the entire free population of Rome, and the vote was taken by units containing one hundred or more persons, and called centuries. The third assembly, the *Comitia Tributa*, was an assembly of the tribes and was probably made up entirely of plebeians.

COMMANDER, a naval officer whose rank is below that of captain and corresponding to that of lieutenant-colonel in the army. The salary of a commander is \$3,500 to \$4,500 per year, according to length of service. This officer is placed in command of war vessels of small tonnage, but usually not of cruiser rank. See NAVY.

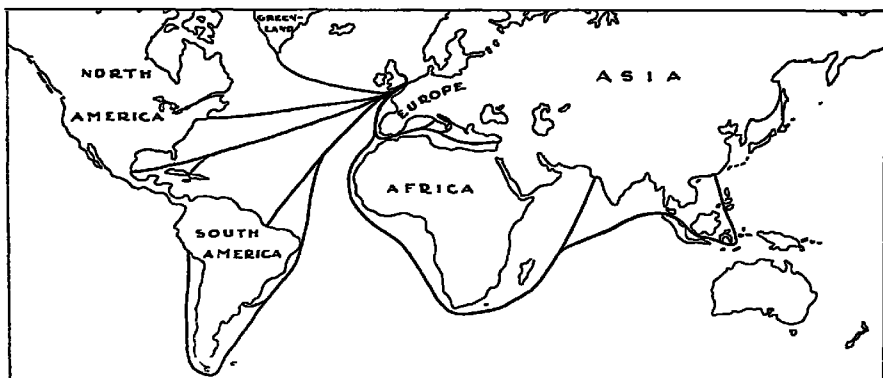
COMMENCEMENT, *kom mens'ment*, in colleges and universities of the United States, the day upon which degrees are conferred upon graduating students, upon candidates for postgraduate degrees, and upon recipients of honorary degrees. The term is commonly used to designate the exercises marking the close of secondary and elementary schools, but this use of the term is not strictly justified.

COMMERCE, *kom'murs*, the exchange of products, and specially, an exchange transacted between people remote from each other. The desire to secure trade in neighboring countries and indeed in distant lands beyond the seas has developed bitter rivalries among the nations and has been the most important cause of many of the world's great wars.

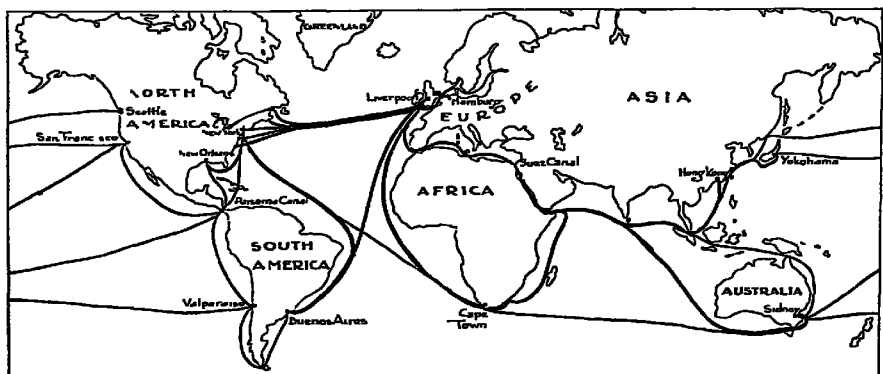
The first means of commerce was barter, the different producers meeting in person and exchanging their goods. With development of civilization and industry, exchanges became so common and complex that some men devoted themselves entirely to conducting exchanges. Thus arose the class known as merchants. During the Middle Ages these merchants began to congregate at certain fairs and places for the more economical exchange of their wares; so markets and fairs came into vogue. Eventually, these market places grew in importance and size until whole towns were given over to this trade and were licensed by the king. With the



Principal Trade Routes of the Mediaeval World by land and sea

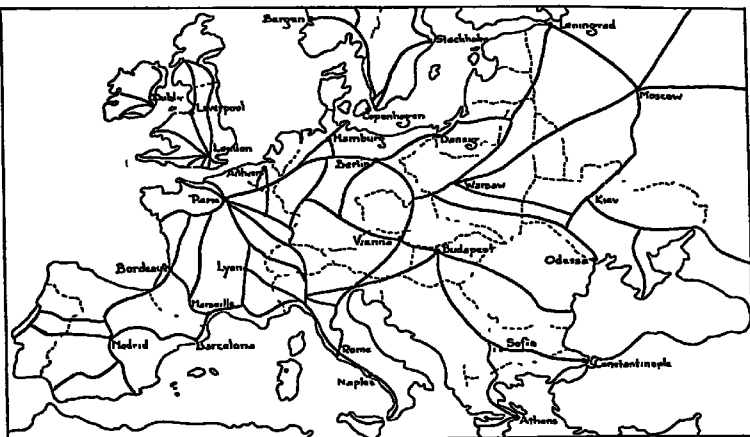


Principal Paths of Trade in 1700

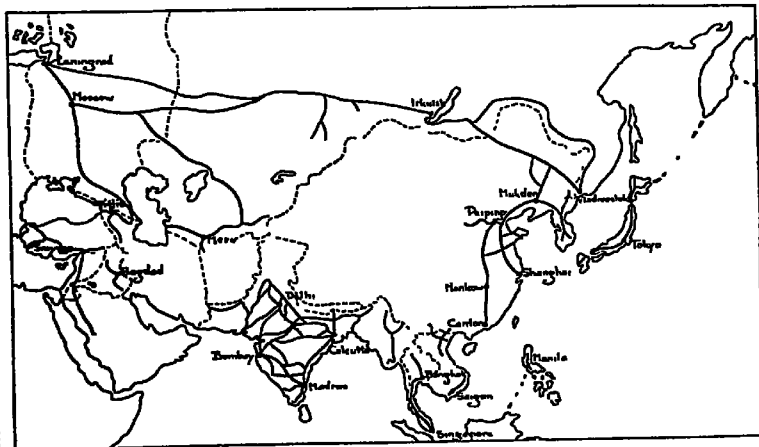


The lines indicate the World's most important modern Paths of Sea Trade

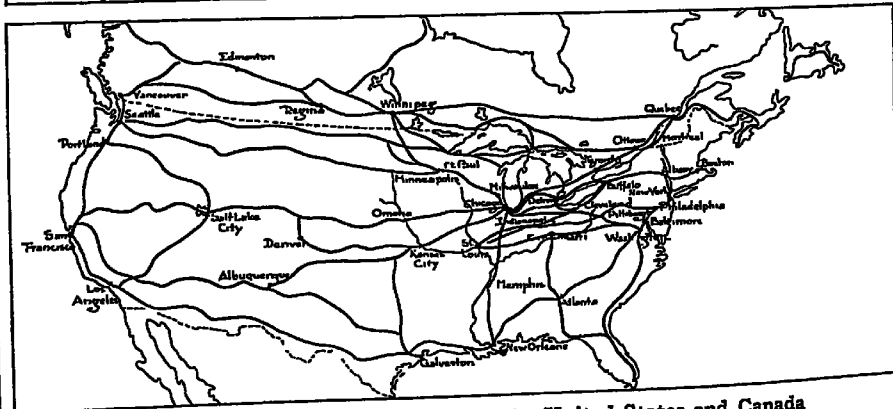
CIVILIZATION FOLLOWS TRADE ROUTES



The
Principal
Railways
of
Europe



The
Principal
Railways
of
Asia



The Principal Railway Systems of the United States and Canada

decline of feudalism, however, and the gradual growth in the independence of individuals, commerce became more general and the old market towns lost their prestige, though fairs and markets are still held in some important cities of Europe. Commerce between Europe and Asia was stimulated by the Crusades, but not until the sixteenth century did trade between nations begin to assume its present world-wide importance.

COMMERCE, CHAMBER OF. See **CHAMBER OF COMMERCE**

COMMERCE, CHAMBER OF, OF THE UNITED STATES See **CHAMBER OF COMMERCE OF THE UNITED STATES**.

COMMERCE, DEPARTMENT OF, one of the executive departments of the United States government, in charge of the Secretary of Commerce, who by virtue of his office is a member of the President's Cabinet (see **CABINET**). The department was organized, with that of Labor, in 1903 as the Department of Commerce and Labor, but in 1913 the two were separated (see **LABOR, DEPARTMENT OF**).

The Department of Commerce embraces a number of bureaus that once belonged to various other departments, such as the Patent Office, the Lighthouse Establishment, the Steamboat Inspection Service, the Coast and Geodetic Survey, the Bureau of Statistics, the Bureau of Navigation the Census Bureau, the Bureau of Foreign Commerce, the Bureau of Standards, and the Fish Commission. It also included two new bureaus, those of Corporations and Manufactures. The duties of the former bureau are to deal with corporations, other than railroads, engaged in commerce with foreign nations and between states. The bureau of Corporations, charged with these important duties, was later transferred to, and became a part of, the Federal Trade Commission.

COMMERCIAL AGENCY, an organization which secures information regarding business houses, for the benefit of other business concerns from whom credit is solicited. The facts ascertained, from intimate investigation, relate to the amount of capital invested, other financial responsibility, promptness with which debts are paid, the moral factor, etc. With such a report before him a credit man may easily determine whether the seeker for credit is a safe risk, and to what amount. The leading commercial agency in the United States is Dun & Bradstreet. See **A 1 AND AAL**.

COMMERCIAL LAW, the law which regulates commercial affairs. It is derived from the maritime codes of medieval Europe, the imperial code of Rome, international law and the customs of merchants. In the United States and Canada the term includes chiefly the law dealing with contracts of every nature. The subjects embraced within it are the laws of shipping, negotiable paper, sales, common carriers, and partnerships, etc.

COMMISSION FORM OF GOVERNMENT, a system of city government, in its inception known as the *Galveston Plan*, because it was introduced into Galveston, Texas, in 1901, following a disastrous flood and resultant disorder in that city. In its simplest form the commission system of city government places the entire administration of the city's business in the hands of a few men, usually five, who are elected by the legal voters. The chairman or president of the commission is the mayor, and each commissioner has charge of some branch of the city's business, for the administration of which he is directly responsible to the people. The commission is the source of all authority in city affairs, makes all the ordinances, appoints all the officers, collects taxes and makes appropriations.

The commission system is characterized by the following features:

1. The assignment of the important divisions of the city government to individual members of the commission, each of whom is directly responsible to the people.
2. Adequate compensation to members of the commission, thus enabling them to devote their entire time to the affairs of the city.
3. Selection of all employees above day laborers on examination, oral and written, and given for the purpose of determining fitness.
4. Provision for retention in office of all employees so appointed, during good behavior.
5. Power of initiation and referendum reserved by the people. See **Referendum**.
6. Power of recall reserved by the people.

In some cities the terms of all commissioners expire the same year, in others, only one retires each year. This system of municipal government has been adopted by about four hundred cities in the United States. Its chief advantage is that it concentrates authority and responsibility in the hands of a few officials. See **CITY MANAGER**.

COMMITTEES OF CORRESPONDENCE, patriot committees organized in the American colonies before the outbreak of the

Revolution. They were in effect publicity, or propaganda, committees, being charged with the duty of collecting and publishing the grievances of the Americans and of maintaining correspondence between the different colonies. In addition, they secured authentic information regarding Parliamentary acts in England. The organization of these committees, the first of which was formed in 1772, was an important step in the process of uniting the colonies.

COMMODORE, *kahm'ô dôhr*, formerly the title of a naval officer of the United States, in rank between captain, below, and rear-admiral, above. The comparative rank in the army was that of brigadier-general. The grade of commodore was abolished in 1899; the men holding that rank were advanced to the next higher grade. The salary was \$5,000 per year.

COMMON CARRIER, an individual or corporation which transports goods and passengers for hire. Two rules of law govern the regulation of carriers: (1) they must carry any who apply to them, without discrimination; (2) they are responsible, in the case of transportation of freight, for the loss or injury of the goods entrusted to them, even without negligence on their part. This responsibility extends to all cases except those arising (a) through "act of God," that is, accidents in which there is no human agency; (b) through act of a public enemy, that is, a government at war, or pirates; (c) through the act or default of the shipper; (d) through acts of public authorities; (e) from the nature of the goods transported; (f) from the ordinary wear and loss, such as perishable goods. The liability of the carrier begins when the goods have been placed in the hands of its agents, and its liability ends when they have been transported to the place agreed upon. This may be, in the case of a railroad, in its freight house at the point of destination; in the case of express companies, at the business or residence address of the consignee.

In relation to *passengers*, the carrier is bound to carry those whom it accepts, without negligence. In the case of accidents it rests with the carrier to show that the accident arose from no fault of its own or on the part of its servants or agents. Hence, injured passengers or, in case of death, their nearest relatives, have a claim for compensation, provided they did not contribute to the

injury by negligence. The same rules apply in general to carriers by water, together with certain special regulations applicable to these carriers alone. In case of danger from tempest or from enemies, ship passengers may be called upon by the captain or commander to lend their assistance for the general safety.

COMMON COUNCIL, the legislative body of a city or incorporated town. In the former it is usually given the name *board of aldermen* (see **ALDERMAN**). The common council sometimes consists of two houses or chambers, but usually is a single body. In American cities the council is elected by the people; the members usually serve two years.

COMMON LAW, the unwritten law, the law that receives its binding force from immemorial usage and universal reception. It consists of that body of rules, principles and customs which has been received from former times, and by which courts have been guided in their judicial decisions. It is contrasted with *statute law*, which is contained in acts of a legislature. Wherever statute law runs counter to common law the latter is entirely overruled. In the United States there is no national common law, but the state courts have relied on the English common law and have developed a fairly uniform system of common law throughout the country.

Related Articles. Consult the following titles for additional information.

Civil Law	Law
Equity	Statute

COMMONS, HOUSE OF. See **GREAT BRITAIN**, subhead *Government*.



COMMON SCHOOLS.

This term as generally understood, refers to schools that are supported by the state and that give instruction in the elementary branches. In every advanced country the common school is recognized as the foundation stone of the nation's progress. A universal common-school system is the only system which insures an education for the

masses, and upon the general intelligence of the citizen body depend the stability and prosperity of the nation.

Common schools date from the Middle Ages, particularly from the Reformation

period. Luther not only favored public schools, but his doctrine made them a necessity to his followers. He held that individuals were responsible for their beliefs, and that these beliefs were to be based on the personal study of the Bible; hence, it was necessary for every one to learn to read. Previous to Luther's time, Latin had been generally taught in the schools, and little or no attention had been given to the teaching of the mother tongue. Now children were taught to read and write their own language. The invention of printing, which occurred a few years before, made it possible to supply the people with books and thus aided in the work of general education throughout Europe. The status of the common schools in each of the European countries is treated in the respective articles, under the subhead EDUCATION.

In America. The American colonists gave early attention to education. Schools were established in Boston as early as 1635, and in 1637 the General Court of Massachusetts decreed that every town having fifty families should establish a common school for the instruction of the children who desired to attend. The expenses of such schools were to be met either by the town as a whole or by the families whose children attended. The same act provided for the establishment of a grammar school, which should fit boys for college, in every town of 100 or more families. Connecticut and New Haven followed within the next few years, but no system of public schools was established in Rhode Island until 1790. Among the Middle Colonies, the Dutch in New York organized a system of public schools before that colony was taken by the English. After this event little attention was paid to public education until after the Revolution. The Swedes in New Jersey and Delaware also founded schools, and the charter granted William Penn provided for a system of public education. This, however, was not carried out until long after Penn's death. In 1698 the Society of Friends established a school in Philadelphia, which is now known as the Penn Charter School, but it was not until after the middle of the eighteenth century that measures were taken for systematic instruction of the children by the colony.

The Southern colonies, having an entirely different social system, did not establish public schools. The large plantations and the

consequently sparse settlement of the country made such institutions practically impossible during the early history of these colonies. The children of planters were taught in their homes, either by tutors or governesses, and the boys of some wealthy families were sent to England to complete their education. The growth of slavery, following the Revolutionary War, perpetuated the early institutions of the South, so that few free public schools were established in the slave-holding states until their reorganization after the Civil War.

The resources of the country were so thoroughly taxed during the Revolutionary War that but little attention could be given to education; consequently there was no progress in the common schools during that period. After the close of the war the New England states gave attention to their schools. With the exception of Massachusetts, in New England and all other parts of the country, free public schools were considered charitable institutions, maintained for the education of the children of those families who were too poor to pay for the instruction; and wherever possible rate bills or local taxes were assessed on all families sending children to these schools. This plan made the schools odious to those for whom they were established, and contemptible to others; consequently it did not succeed.

The establishment of public schools at state expense was undoubtedly delayed because of the lack of funds, and the condition of the country was such during the years immediately following the Revolution that increased taxation for any purpose was impossible. In 1805 the Public School Society of New York was formed. The purpose was to maintain schools for the instruction of those children whose parents were unable to provide it themselves, but the plan was soon broadened to include all children who applied, and from this the ascent to the support of common schools by the state was comparatively easy. Soon after this New York provided for county supervision of schools. Pennsylvania was somewhat behind New York, but the New England states were in the van of the movement. As the states west of the Alleghenies were organized, school systems, modeled after the plan of the states from which the settlers had come, were instituted.

The common schools of the United States

are now, with few exceptions, thoroughly organized and economically managed. All cities, large towns and villages have graded schools, and in many states graded courses of study are provided for the rural schools. Immense sums have been spent upon buildings, grounds and appliances in cities and towns and in the wealthier rural communities. While each state is a law unto itself, as far as its determination of courses of study, qualifications of teachers, methods of organization and management are concerned, yet in their main features all of the state systems are essentially the same. Though there is not, technically or legally, a national system of education, the uniformity of these state systems practically makes the whole system national.

Consult, in each of the state articles, the subhead Education. See, also High School, subhead Junior High School.

COMMONWEALTH OF ENGLAND, the name usually given to the form of government which was in force from the death of Charles I, 1649, to the restoration of Charles II, in 1660. That is, it was the period during which England was governed without a king. The interval in which Cromwell governed as Lord Protector, from 1653 to his death, is known as the Protectorate. See **CROMWELL, OLIVER**.

COMMUNE, *kom mun'*, the smallest government district in France and in some other countries, as Belgium. A commune sometimes embraces a number of villages, while some large cities are divided into a number of communes. In either case each commune is governed by an officer called a mayor, who is assisted by a deliberative assembly called the *conseil municipal*. In America the township is the local unit most like the commune.

COMMUNE OF PARIS, a name applied in French history to two bodies which at different times ruled Paris. The first was a revolutionary committee which in 1792 took the place of the municipal government of Paris and soon usurped the supreme authority in the country. Among its chiefs were some of the most violent of the demagogues, such as Hébert, Danton and Robespierre (see **FRENCH REVOLUTION**).

The name was also adopted by the ultra-radical party brought in to prominence by the events of the Franco-German War, and, more immediately, by the siege of Paris (October, 1870, to January, 1871). This party

ruled Paris for a brief period after the evacuation of the German troops and had to be suppressed by troops collected by the National Assembly of France. During this régime much valuable property was destroyed.

COMMUNISM, originally an economic system altruistic in conception, in which no man in a society owned property in his own right; he gave his labor for the good of all, and the needs of himself and his fellows were supplied from the common fund. Several such experiments have been tried within a century, but all have been abandoned.

The basis of Communism has undergone a change, revolutionary but understandable. Radical minds, viewing with intolerance an ordered state of society under capitalism, seized upon its principles and carried them to the extreme that resulted in the flowering of the government of Soviet Russia, a vast Communist state, the only example of its kind.

In Russia Communism is the "rule of the proletariat" (the common people, the class without property), where the structure of capitalism, representing all that had stood for repression under the czars, no longer exists, but is made to serve the working classes; class distinctions are levelled.

The workers control the state, through committees called soviets, but dictators assume control of public thought and action, and the workers, tamely submissive, are themselves under stern repression.

COMMUNITY CENTER. The spirit of friendly cooperation in local communities is one of the most encouraging aspects of modern life. It is being particularly manifested in the establishment of neighborhood centers, where all the people of the community meet on a common footing for recreation, fellowship or educational uplift. Most important of the agencies used for neighborhood cooperation is the school. Prof. Edward J. Ward, a specialist in community organization, has been chiefly instrumental in furthering the idea of making the school a community center.

The plan recommended by Professor Ward is about as follows: There should first of all be a preliminary organization of the adult citizens of a neighborhood. They may apply to the proper authorities for the use of the school building in the organization of a neighborhood forum, conducted on the same plan as a debating or literary society.

The neighborhood forum gives opportunity for the presentation and discussion of questions pertaining to the community, and provides a basis for a broader organization of the community center. The ideal sought is the establishment of a center where neighborhood athletic, dramatic, social and educational clubs may meet, where young people may gather for recreation, where questions of civic welfare may be discussed, and people of all ages may meet for holiday celebrations and reunions.

To further the efforts of community workers the Hollis-Johnson Community Forum Bill was drafted and introduced into Congress. It provides for a completed community center along the following lines:

That whenever a public school building shall have been established as a community forum under the provisions of this act, and upon request to the board of education so to do by a majority of the adult persons present and qualified to vote at any regular meeting, the said board shall designate such building as a community center for the organized training and recreation of the young people of the community, including such activities as may be requested by the said adult organization and approved by the said board, and shall make all necessary and appropriate arrangements for the convenient and proper use of the building for community center meetings and activities, at such times as the said adult organization may request and the said board approve.

It shall be the duty of the board of education to provide out of appropriations of public funds authorized for the public schools, light, heat, janitor service and such other expenses as may be necessary to enable the comfortable and convenient use of public school buildings as community forums and community centers under the provisions of this act.

COMO, a lake in the north of Italy, at the foot of the Alps, fed and drained by the river Adda. It is celebrated for the beautiful scenery of its shores, which are covered with handsome villas, gardens and vineyards, behind which mountains rise to the height of 7,000 feet. Trout and other fish abound in the lake. The chief towns on its shores are Como, Bellano, Bellaggio and Menaggio.

COMO, *ko'mo*, ITALY, capital of the province of Como, in the northern part of the country, in a delightful valley at the southwest extremity of Lake Como. The city is twenty-four miles northwest of Milan. It has a splendid marble cathedral, dating from the fourteenth century. The manufactures

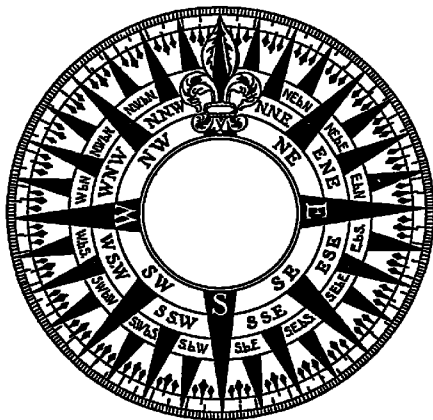
include woollens, silks and cotton. Here were born Pliny, the Elder and the Younger, and Volta, the physicist. Population, 1931, 54,138.

COMORO, *kah'm'o ro*, ISLANDS, since 1914 a colony of France, in the Indian Ocean, attached to the government of Madagascar. There are four islands, with an area of 800 square miles and a population of 98,000. The entire group was ceded to France in 1886, but the largest island, Mayotta, has been a French possession since 1842.

COMPANY, in commerce. See PARTNERSHIP; CORPORATION; TRADING COMPANIES.

COMPASS, *kum'pas*, an instrument for determining direction with reference to the north and south points. The earth is a gigantic magnet, with its poles near the geographical north and south poles; and the attraction of these magnetic poles is sufficient to keep the needle pointing north and south (See MAGNETISM.) Compasses are usually classified as the surveyor's compass, the mariner's compass and the variation compass.

The surveyor's compass consists of a magnetic needle enclosed in a circular box and



THE MARINER'S COMPASS

moving over a disk graduated to degrees, minutes and seconds. The frame has two vertical sights at opposite ends of a diameter, so as to secure accurate pointing. The direction of the line in which the compass points is determined by reading the number of degrees between the north pole of the needle and the line of sight. A level and a tripod are necessary parts of a surveyor's compass.

The *mariner's compass* is used on board ship; it consists of several magnetic needles arranged parallel to one another and attached to a card, which is mounted at its center upon the end of an upright steel pivot. The whole arrangement is enclosed in a circular brass box, which is hung within a wooden box and is so fixed that the compass card remains horizontal, whatever position the ship may take. The card is divided into thirty-two equal parts by lines drawn from the center to the circumference. The intervals between these points are divided into halves and quarters, so that the entire circumference is divided into 360 equal parts or degrees. Four principal points, north, south, east and west, are designated as *cardinal points*. The names of the others are compounds of these. The direction of the ship is determined by noting the number of degrees between the north pole of the needle and the course as indicated by a line from the center of the wheel to the point of the bow.

Navigators' tables, indicating the variation of the compass in various parts of the ocean, are in general use, and by these the navigator is able to correct his compass without difficulty. See *GYRO-COMPASS*.

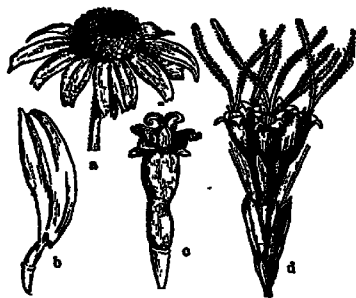
Boxing the Compass. To *box the compass* signifies ability to name from memory, in proper order, all the points, half points, quarter and eighth points of the compass, starting from any point. Every helmsman must be proficient in this.

COMPASSES, or DIVIDERS, a mathematical instrument, used for describing circles and measuring lines. The compasses consist simply of two pointed legs, movable on a joint or pivot, and they are used for measuring and transferring distances. For describing circles the lower end of one of the legs is removed and its place is supplied by a holder for a pencil or pen. *Hair compasses* are compasses having a spring, tending to keep the legs apart, and a finely threaded screw, by which the spring can be compressed or relaxed with the utmost nicety and the distance of the legs regulated to a hair's breadth.

COMPASS PLANT, an annual plant belonging to the composite family, common in the prairies of the Western states. The large, ragged leaves grow upright on rather long stems. As the structure of these leaves is the same on both sides, both surfaces are equally sensitive to the light, and they are

able to secure an equal amount of light for both sides of the leaves only by having their edges vertical and their tips to the north and the south. Hence the name of the plant. *Resin weed* is another name for this plant, derived from the fact that the stems contain resinous matter.

COMPOSITE, kom pos'it, FAMILY, or COMPOSITAE, kom pos'itee, the largest family of plants, containing over 12,000 known species, which are grouped in 1,000 genera. They consist of herbs or shrubs and are distributed all over the world. The characteristic of the family is the head of small flowers, which in itself is sometimes mistaken for one large flower. The resemblance is made stronger by the fact that in many species the flowers in the outer margin of the head are different in form from the others,



COMPOSITAE

a, Flower head, b, Single ray flower, c, Single disc flower, d, Small head with tubular flowers only.

and their tubular corollas are modified so as to resemble the petals of a simpler flower. The small flowers in the middle of the head, which resemble the pistils and stamens of a typical flower, are intermingled with bristles and scales of various forms, which, with the appendages to the seeds, are important factors in classifying the plants of this difficult group. While a typical flower is on the plan of five and is perfect, yet the outer flowers are irregular and not infrequently imperfect and sterile.

When it is remembered that nearly one-tenth of the known species of flowering plants belong to this one family, its importance may be understood. A great many of the plants are cultivated for ornament, and some few serve as food plants. Others have considerable medicinal value. A great many different plants of this order are described under appropriate titles in this work

Related Articles. Among the plants of this family reference to the following will prove helpful.

Africa
Aster
Chrysanthemum
Dahlia

Daisy
Goldenrod
Lettuce
Thistle

COMPOSITION OF FORCES, in physics, is the union of several forces that are acting

in different directions, into an equivalent force acting in a different direction. Thus, two forces, as X and Y, acting in the

directions of the adjacent sides of the figure ABCD, unite to form a force acting in the direction of the diagonal AC. If the lengths of the adjacent sides of the parallelogram represent the relative magnitudes of the forces, the diagonal will represent the magnitude of the compounding force. The length of the diagonal, or equivalent force is called the *resultant*.

COMPRESSED AIR, air confined under pressure greater than the pressure of the atmosphere, which is about 14.7 pounds to the square inch at sea level. The simplest example of air compressed and made to perform work is found in the boy's popgun, whose barrel is made from an elder stalk from which the central pith has been extracted. Applying the same principle to mechanics in a great variety of ways, men have put air to work to operate large hammers, rock drills and other pneumatic tools, air hoists, canal locks and some classes of elevators; to lift water, acids, and other liquids; as a treatment for tuberculosis, by expanding the lungs; to paint broad surfaces, such as bridges, freight cars, warehouses and buildings, to force plastic material through dies, holes and pipes; to operate mine cars and brakes on railroad cars; to inflate pneumatic tires for automobiles, bicycles and carriages; to drive the sand in a sand blast; to clean carpets, rugs, cars, and for hundreds of other purposes.

As a means of transmitting power compressed or condensed air received the attention of scientists as early as A. D. 1700. See **AIR BRAKE**; **PNEUMATIC TOOLS**.

COMPROMISE, *kom'pro mize*, OF 1850, a set of compromise measures passed in August, 1850, in the Congress of the United States, their purpose being to allay the strife

over slavery by granting concessions to both parties. Under the compromise, Texas was allowed \$10,000,000 for renouncing its claims to New Mexico; California was admitted to the Union as a free state; New Mexico and Utah were organized as territories, with the right to adopt or reject slavery; the slave trade was abolished in the District of Columbia; fugitive negroes were denied a trial by jury, but were to be returned to their owners upon certain affidavits. This latter provision was known as the Fugitive Slave Law (which see). The compromise was passed largely through the efforts of Daniel Webster, Henry Clay and John C. Calhoun, each of whom made his last great speech in its behalf.

COMPTROLLER, *kon troh'ler*, a public officer, usually appointed and not elected, is a person whose duty is to audit and certify public accounts. His tasks are similar to those of an auditor, but he has more extended powers, including executive functions.

In the United States government the *Comptroller of the Treasury* must sign all warrants for the payment of money out of the Treasury, and he therefore controls absolutely all the vast expenditures of the Federal government. Any proposed payment he deems not in strict conformity with Congressional appropriations he may refuse to sanction, and there is no appeal from his decision except to Congress.

COMPULSORY EDUCATION. The right of the state to educate the child for citizenship has been recognized from ancient times. The best example of compulsory education among the early nations is the system adopted by the Spartans. Their education of boys was primarily military and had for its purpose the making of soldiers. But from compulsory training in military affairs to compulsory training in other lines was an easy step, and Athens extended its training to include other subjects than those dealing with war.

As the term is now applied, compulsory education means compelling the attendance of children of school age, usually between six and fourteen or six and sixteen years of age, upon the elementary schools, public or private, for a specified number of months each year. Laws compelling such attendance are in force in all progressive countries throughout the world. In the United States compulsory attendance measures are almost

as old as the public school system, but state laws for the purpose did not receive general attention until the latter half of the nineteenth century. Most of the states now have stringent laws requiring parents to send children to school and providing for fines, and in some cases for imprisonment, as penalties for failure to comply with the law. Children who have acquired a knowledge of the branches taught in the common schools, defectives and those in ill health are exempt. Compulsory education laws are necessary because of the increasing tendency to employ children in mines, factories and large stores. In the large cities these laws are quite rigidly enforced, but in the rural districts and in most of the smaller towns the authorities are sometimes indifferent.

The laws are enforced by truant officers, who are appointed by the local board of education. These officers have authority to arrest any child to whom the law applies and commit him to school in his district. If, after warning, the parents do not keep their children in school, the truant officer has authority to have such parents arrested and brought before the local court for trial. In some large European cities truant schools, in which habitually truant pupils can be confined, are in operation.

COMTE, *koNt*, ISIDORE AUGUSTE MARIE FRANÇOIS XAVIER (1798-1857), the founder of the positive system of philosophy, or Positivism, was born at Montpellier, France. When sixteen, he entered the polytechnical school at Paris, from which he was expelled two years later. After this he became interested in the socialistic teachings of Saint Simon, from which the doctrines of his own system originated. In 1826 he undertook a series of lectures, but was unable to complete the work, because of temporary mental derangement. After recovery he began systematic work upon the exposition of his doctrines, which he gave in his *Course of Positive Philosophy*, a work consisting of six volumes and requiring twelve years for its preparation. He was for a few years professor of mathematics in the polytechnic school, but was dismissed, and during the remainder of his life he was supported chiefly by his friends.

The underlying principle of Comte's philosophy is known as "the law of three stages." According to this law, intelligence, whether of the individual or of society, has passed

through three stages or periods of development: the *theological* stage, in which supernatural beings are believed to produce all phenomena; the *metaphysical* stage, in which abstractions, such as mental or physical force, are regarded as the causes of all activity, and finally, the *positive* stage, in which the search for ultimate causes is given up, and effort is confined to discovering the actual relations or associations that observation shows to exist among phenomena.

CONCEPCION, *kon sep se oon'*, CHILE, a seaport of South America, capital of a province of the same name, situated six miles from the mouth of the Biobío River and 270 miles southwest of Santiago. The chief buildings are a cathedral, an agricultural school, a normal school and a town hall. Its port is Talcahuano, about eight miles distant. Concepcion was founded in 1550 by Valdivia and has been several times nearly destroyed by earthquakes. Population, 1930, 77,600.

CONCEPT, *kon'sept*, in psychology, the name generally given to the idea of a class, or general, notion. The first step in the formation of concepts is the acquisition of individual ideas through the senses. As these ideas are acquired, they are compared and their points of similarity and dissimilarity are noted. The qualities given to the ideas are separated from the others and grouped together, forming an idea which applies to all the objects of the class. This idea is a concept. One's idea of *orange*, *apple*, *horse*, applies to all oranges, all apples or all horses, as far as his knowledge of each of these classes of objects extends, and it is not an idea of any particular orange, apple or horse. A concept is an abstract idea consisting of a group of qualities common to all objects to which it can be applied. In this respect it is different from an image. An image is a mental picture of an individual object, which includes all of that object's peculiarities. One's concept of man, if accurate, will apply to all men; but the mental image of one's father includes all of those peculiarities pertaining to the father's personal appearance, such as height, weight, facial expression, color of hair and eyes.

The formation of concepts is the first step in thinking. It begins early in life and is at first spontaneous. The earliest concepts are very crude, and they need to be perfected through voluntary observation. Parents and teachers can materially assist children in the

formation of concepts, by observing the following principles:

(1) There is a vital connection between sensation, perception and the formation of concepts. The child's success in forming class ideas depends upon the care with which he has acquired individual ideas.

(2) The child should be trained to form clear and correct concepts early in life, since the time soon comes when ideas of individual objects obtained through perception will not be sufficient for his needs, and he will have to draw upon the idea earlier acquired as a basis of comparison, in order that he may correctly classify his knowledge. If his early concepts are correct, his classification will be much more accurate than if these concepts are false.

(3) Concrete illustrations are necessary to enable children to form correct concepts, and these should be chosen with care. They should bring before the child the idea which he should obtain and should be clear and pointed.

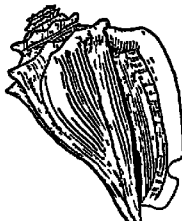
(4) One should always be able to change his concepts into images of the individuals for which the concept stands. In other words, one should be able to apply his general notions to individual cases. If he is not able to do this, his concepts are not clear. Much of the difficulty which pupils experience in arithmetic, grammar and other branches arises from their inability to image their concepts, or, in other words, to apply the principles and rules which they have learned to the solution of problems presented to them. This difficulty can usually be avoided if concepts are formed through observation.

Related Articles. Consult the following titles for additional information:

Abstraction	Methods of Teaching
Inductive Method	Perception
Judgment	Thought

CONCERTINA, *kon sur té'nah*, a musical instrument, an improved form of the accordion (which see). It is composed of a bellows, with two faces or ends, generally polygonal in shape, on which are placed the various stops, or studs. By the action of these, when they are manipulated by the performer's fingers, air is admitted to metallic reeds, which produce the sounds.

CONCH, *konk*, a tropical mollusk having a heavy spiral shell. In the East Indies the shell of one species is perforated at the tip, fitted with a mouth-piece and used as a musical instrument. In the United States and Europe conch shells are ground for use in porcelain manufacture. Cameos are sometimes cut from



CONCH

these shells, and buttons also are made from them. The egg cases of the conch are known as "sea necklaces," as they resemble leathery disks strung on a cord.

CONCLAVE, the assembly of the Roman Catholic cardinals for the election of a Pope. A two-thirds vote is necessary for an election. The cardinals meet in a part of the Vatican which has been divided into several small apartments. After the first day they are locked in and are allowed no communication with the outer world till after the election takes place. Even the food, passed through a window, is thoroughly examined that no letters or notes may reach the members of the Sacred College. See SACRED COLLEGE; POPE.

CONCORD, BATTLE OF. See LEXINGTON, BATTLE OF.

CONCORD, MASS., a town of Middlesex County, occupying an important place in American historical and literary annals. Here, at Concord Bridge, April 19, 1775, the first shots of the American Revolution were fired, and a monument on the bank of the river marks where two English soldiers fell. It is also famous as the home of Ralph Waldo Emerson, Hawthorne, Thoreau and Louisa M. Alcott; Orchard House, the home of the authoress, is an interesting landmark. Another point of interest is beautiful Sleepy Hollow Cemetery, where Thoreau, Emerson and Hawthorne are buried. Concord is twenty miles northwest of Boston, on the Concord and Sudbury rivers. Population, 1930, 7,477.

CONCORD, N. H., the capital of the state, its third city in size, and the county seat of Merrimack County, seventy-five miles northwest of Boston, on the Merrimack River and on the Boston & Maine Railroad. The noteworthy buildings include the statehouse, the Federal building, the courthouse, the state insane asylum and the state library. Saint Paul's School for boys and Saint Mary's School for girls are located here. The quarrying of granite in the vicinity is the leading industry. Concord was founded in 1725 as Pennacook, and it was incorporated as Rumford eight years later, but was renamed Concord in 1765 and incorporated as a city in 1853. Mary Baker Eddy, founder of Christian Science, lived here. Population, 1920, 22,167, in 1930, 25,228.

CONCORDANCE, an index in which all the important words of any work are ar-

ranged alphabetically, with references to show where each word occurs. This sort of concordance is called a *verbal* concordance while a similar work in which subjects are indexed is known as a *real* concordance. By far the greatest number of concordances treat of the Bible. The best concordances of the English Bible are Cruden's, Robert Young's and James Strong's. Concordances have been made for Shakespeare, Tennyson, Milton, Pope, Dickens and others.

CONCORDAT, *kon kawr'dat*, a term applied to a formal agreement entered into by the Pope and a secular government pertaining to Roman Catholic affairs within the country involved. Sometimes it takes the form of a Papal bull, and sometimes that of a formal treaty. During the period of Papal supremacy in temporal affairs concordats were of much greater importance than now.

CONCRETE, *kon kreet'*, a composition which may be described as artificial stone, used in rapidly increasing quantities for a wide range of building purposes. Its most common use for years was for road building, for it makes a hard, smooth and durable highway. When covered with a coating of asphalt a road is made as smooth as a floor. Within recent years the uses of concrete have been so extended that the present has been very correctly termed the "Concrete Age." Today great business blocks are constructed of concrete, reinforced by steel frames; mammoth factories, fine residences, beautiful bridges and handsome viaducts are built with it. An effort to popularize large freight vessels built of concrete did not succeed. The few boats built were not serviceable.

Concrete is made by mixing cement, sand and gravel or crushed stone in the proportions of one part, two parts and four parts, respectively; sufficient water is used to wet each particle of material used. Such a mixture is known as *reinforced concrete*. Another combination frequently employed, though not considered as desirable, is one part cement, three parts sand and six parts gravel or crushed stone, with the necessary water; this combination meets all requirements for most uses.

A plastic mass such as results from the mixing of these ingredients may be pressed into any desired form and admits of architectural designs which are particularly pleasing. The concrete, for all building purposes, is

poured into molds and firmly pressed; when it hardens the molds are removed. Concrete for small structures is often mixed by hand by the use of shovels, but when large quantities are needed mixing machines, run by steam or electricity, are employed.

For about three cubic yards of concrete there are required one cubic yard of sand, two cubic yards of gravel or crushed stone and 1,000 pounds of cement.

CONDENSATION, in natural science, the passing of a vapor or a gas into the form of a liquid. The formation of raindrops is an example of condensation, the necessary conditions being the presence of vapor in the air and a fall of temperature. When the temperature reaches a certain point the vapor condenses into the water and rain falls. Other examples of condensation are the formation of dew (which see) and the "sweating" of pitchers of ice water. See **HEAT**; **RAIN**.

CONDENSED MILK. See **MILK**, **CONDENSED**.

CONDOR, a huge bird of the South American Andes, belonging to the vulture family and noted for its powers of flight, strength and keenness of sight. It attains a length



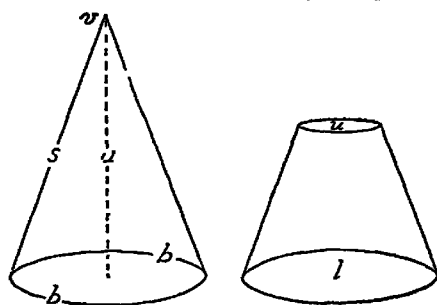
CONDOR

of fifty-five inches, and its wing expanse is from eight and one-half to ten feet or more. The condor is for the most part black, with white wing markings. There is a ruff of

soft white feathers around the lower part of the neck, the skin above being bare and folded. Condors live upon dead animals and decaying flesh, and like others of their group they are greedy eaters. Often they gorge themselves until too heavy to fly, and if they are attacked they resort to the disgusting practice of disgorging what they have eaten. Their haunts are two or three miles above sea level, the eggs being deposited on bare rock. They generally breed in small flocks. In Southern California is found a closely related species called California vulture.

CONDUCTOR, ELECTRICAL. See **ELECTRICITY**, subhead *How Electricity Travels*

CONE, a solid body whose base is a circle and whose sides taper uniformly to a point.



CONE AND FRUSTUM

a, Altitude; b, Perimeter of base, s, Slant height, v, Vertex, l, Lower base, u, Upper base

This point, the highest position, is called the *vertex*; the circular bottom is the *base*; the curving and diminishing exterior is the *convex surface*.

The area of the convex surface is equal to the circumference of the base multiplied by half its slant height. The volume of the cone is equal to the area of the base multiplied by one-third its altitude (the perpendicular distance from vertex to base). To find area of base, see the article **CIRCLE**.

CONE-BEARING TREES. See **CONIFERAE**, or **PINE FAMILY**.

CONEY, ko'ne, ISLAND, one of the most famous pleasure resorts in the world, situated off the south shore of Long Island, nine miles southeast of the Battery, New York City. It is in Kings County, and was annexed to Brooklyn in 1894. Though the name refers to the entire island, the thousands of pleasure seekers who throng there every summer go usually to the section offi-

cially called West Brighton. To the average visitor, this gay and crowded district is "Coney." In other parts of the island there are beaches, hotels and residences. Coney Island is of historic interest as the place of Henry Hudson's landing in 1609.

CONFEDERACY, UNITED DAUGHTERS OF THE, a patriotic society of women, banded together to preserve the memory of those who suffered for the South during the Civil War. The society was organized in Nashville, Tenn, in 1894. It is composed of the direct female relatives and lineal female descendants of those who helped the Confederacy by fighting or otherwise. Local chapters are under the direction of state divisions, and these are controlled by a general organization. In 1918 the society had a membership of over 80,000 and 1,300 local chapters.



Confederate Capitol, Richmond

CONFEDERATE STATES OF AMERICA, a league of states formed in 1861 by eleven American commonwealths which seceded from the Union. The disunion was brought about by the existence of slavery, and was followed at once by four years of the greatest civil war the world has ever known.

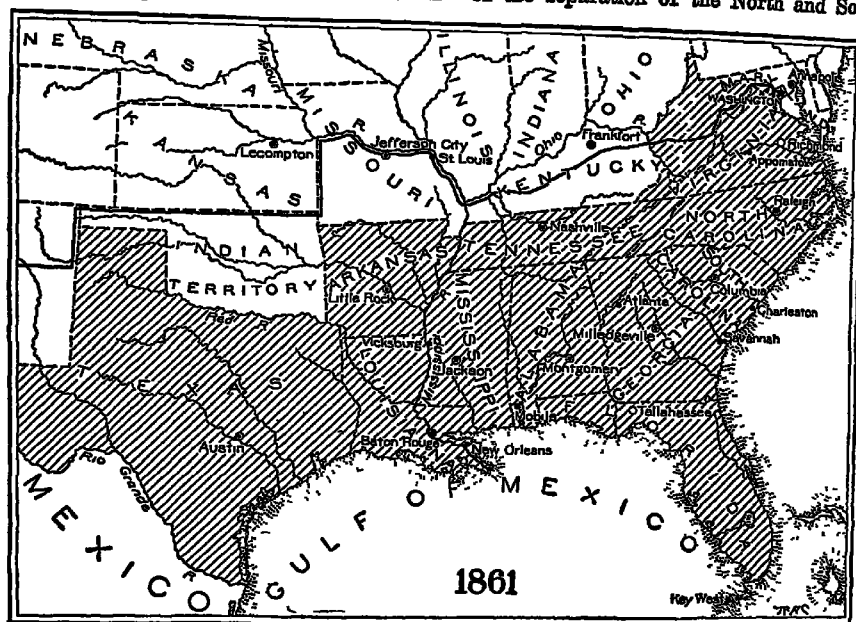
The first move in the formation of the Confederate government was made by South Carolina. A convention in that state passed an ordinance of secession on Dec. 20, 1860, and expressed the hope that the other states contemplating secession would join in a federation. Three weeks later the convention of Mississippi indorsed this proposal, as did also the convention of Florida, January 10, 1861. On January 11 the convention of Alabama recommended that the seceding states send delegates to a congress called to meet at Montgomery, Ala., February 4, 1861, to form a federation. South Carolina, Mississippi, Florida, Alabama, Georgia and Louisiana were represented in this convention and organized as a Provisional Congress of the Confederacy.

On February 8 a temporary Constitution was adopted, to be in force for one year from the inauguration of the President, or until a permanent Constitution should be adopted. Jefferson Davis of Mississippi was

chosen temporary President and Alexander H. Stephens of Georgia, temporary Vice-President. The Congress enacted that all laws of the United States in force in the Confederate States on Nov. 1, 1860, and not inconsistent with the Constitution of the Confederacy, be continued in force until repealed or altered by the Confederate Congress. The more important Congressional committees—on war, finance and foreign relations—were appointed at once. During the year 1861 Texas, Arkansas, Virginia, North Carolina and Tennessee passed ordinances of secession

Davis had chosen his Cabinet, which represented every state in the Confederacy, among the members being men of exceptional ability, as Robert Toombs and Judah P. Benjamin.

The first important act of the Congress was to make provision for a permanent army. It then devoted itself to seeking foreign recognition and assistance and to building up a financial system for the support of the government. From the first, however, it also sought peace upon the basis of the separation of the North and South,



THE CONFEDERATE STATES OF AMERICA

and joined the Confederacy. On March 11 a permanent Constitution was adopted by the Congress and submitted to the various states for ratification. This Constitution was in general similar to that of the United States, but different from it in some important respects: The term of the President was fixed at six years, and he was ineligible for re-election; slavery was sanctioned, and slaveholders were given the privilege of taking their slaves into any state or territory; Cabinet officers were given seats in Congress, according to the system prevailing in Great Britain; the states expressly retained their sovereignty. Meantime, the executive departments had been organized, and President

but all efforts in this direction were vain. On Nov. 6, 1861, Davis was chosen permanent President and Stephens permanent Vice-President of the Confederacy, by a unanimous vote. During the next few months the extraordinary demands made upon the government by the war and the necessity of using all the capable soldiers in military capacities led to a decline in the strength of congress as a body, and the consequent centralization of power in the hands of the executive, and especially of President Davis. His services, therefore, as head of both the civil and military administrations of the Confederacy, involved tremendous responsibilities, and he was not free from criticism, es-

pecially directed at the gradually growing supremacy of the military over the civil law, and at the extraordinary orders and decrees which he found necessary in order to secure support for the government. The chief difficulties of the Confederacy were due to the lack of funds; for the import duties, which under ordinary conditions would have constituted the chief source of revenue, were almost entirely excluded by the blockade, and there was also a strong sentiment against the imposition of internal taxes. The government was finally compelled to issue vast sums in paper money, or government notes, and to exchange government bonds for provisions and ammunition. The confusion was increased by the issuance by states, cities, banks, corporations and even private citizens, of notes for circulation as money. The decline in value of this money naturally led to fabulous increases in the price of all commodities. During the war the price of flour was at times \$400, Confederate money, per barrel, shoes sold at \$150 a pair; the use of tea and coffee was practically abandoned; ice was used only by the most wealthy citizens, and such common necessities as coal, wood, medicines and salt were classed as luxuries.

The permanent Senate and House held two sessions, the final adjournment being taken March 18, 1865, about a month before the close of the conflict. The armies of the Confederacy surrendered to the Federal armies, and the struggling government ceased to exist.

The story of the war, told in the article *Civil War in America*, gives further details regarding the Confederate States. See, also, *Slavery*.

CONFEDERATE VETERANS, UNITED, a patriotic society composed of veterans of the Confederate army, organized at New Orleans, La., in 1889, for the purpose of strengthening the friendships formed during the war, preserving the memory of dead comrades and aiding veterans and their widows and orphans. The organization is supported by more than 1,800 local *camp*s, divided into three departments, and it includes about 50,000 members. It holds annual reunions.

CONFEDERATE VETERANS, UNITED SONS OF, a patriotic society composed of the male descendants of Confederate veterans, organized at Richmond, Va., in 1896, for the purpose of gathering and preserving historic

relics and data, from which to write a history of the Civil War from the Southern standpoint. The organization is divided into three departments and many local *camp*s. In 1902 it purchased Beauvoir, the home of Jefferson Davis, on the Gulf shore in Mississippi, to be used thereafter as a home for Confederate veterans.

CONFEDERATION, ARTICLES OF, the written instrument of government adopted by the thirteen states in America in 1781. The Articles were the work of a committee appointed upon the same day as was the committee to draw up the Declaration of Independence. The Articles were reported to Congress July 12, 1776, but a prolonged debate ensued and they were not adopted until November, 1777. They were then sent to the state legislatures, whose unanimous consent was necessary to their final adoption. By May, 1779, all the states except Maryland had ratified the Articles, but Maryland demanded that states should first cede their territorial claims in the Northwest Territory to the Federal government. This being done, Maryland signed the articles, March 1, 1781.

The articles provided for a "firm league of friendship," under the title *United States of America*, and declared that each state should retain its sovereignty and all the rights and powers which were not expressly delegated to the United States. The government was to be in the hands of Congress, composed of not less than two nor more than seven delegates from a state, each state having, however, but one vote. Though Congress could decide disputes between the states, it had no power to regulate commerce or to raise revenue; it could declare war, but could not raise troops; it could make appropriations, but could not collect taxes; it could pass laws, but could not compel their observance; it could borrow money, but could not guarantee its repayment. Under this weak and decentralized government, conditions in the colonies became grave, and the conviction became widespread that a new government must be formed, possessing more powers than did the one created by the Articles. The result was the Constitutional Convention and the Federal Constitution adopted in 1787. See **CONSTITUTION OF THE UNITED STATES**.

CONFEDERATION OF THE RHINE, a league of German princes formed in 1806

CONGRESSIONAL, *kon gresh'un al*, LIBRARY. See LIBRARY OF CONGRESS.

CONGRESSIONAL RECORD, the daily printed report of the proceedings of the Congress of the United States. From 1789 to 1824 this was known as the *Annals of Congress*; from 1825 to 1837, as the *Register of Debates*; from 1837 to 1874 as the *Congressional Globe*. It does not contain an accurate record of the actual proceedings of Congress, since members are often allowed the right to insert speeches which they have never delivered, or to revise remarks which they have made before the House.

Any person may subscribe for the *Record*, at \$1 50 per month, \$4 for the short session of Congress or \$8 for the long session. It is furnished free to public libraries.

CONGRESSMAN - AT - LARGE. The Congress of the United States determines the number of members the House of Representatives shall contain for each ten-year period following the taking of the census. Each state is divided into as many districts for election purposes as the number of Representatives allotted to it, and each district chooses one member. If any state is entitled to an additional Representative under a new apportionment it need not defer his election until a new district is created, but may elect him from the state at large. All the voters of the state participate in the election.

CONGRESS OF MOTHERS, NATIONAL. In February, 1897, a group of parents, educators, clergymen and statesmen met in Washington, D. C., to formulate plans for improving the condition and prospects of the children of the country. The leading figures of the gathering were Mrs. Theodore W. Birney and Mrs. Phoebe A. Hearst. A constitution was adopted, in which the aims of the Congress were stated to be as follows:

The objects of this Congress shall be to raise the standards of home life, to give young people opportunities to learn how to care for children, so that when they assume the duties of parenthood they may have some conception of the methods which will best develop the physical, intellectual and spiritual nature of the child, to bring into closer relations the home and the school, that parents and teachers may cooperate intelligently in the education of the child, to surround the childhood of the whole world with that wise, loving care in the impressionable years of life that will develop good citizens; to use systematic and earnest effort to this end through the formation of Parent-Teacher As-

sociations in every public school and elsewhere, through the establishment of kindergartens, and through distribution of literature which will be of practical use to parents in the problems of home life, to secure more adequate laws for the care of blameless and dependent children, and to carry the mother love and mother thought into all that concerns childhood. The Congress believes that, with the aid of Divine Power, these objects will be accomplished.

As a result of this movement Parent-Teacher Associations have been established throughout the United States, the child-welfare movement has been promoted along various lines, legislation favorable to children has been encouraged, and a Home Education Division of the Bureau of Education established. Parent-teacher associations became popular and influential, and the two organizations voted to merge in 1924. See PARENTS AND TEACHERS, NATIONAL CONGRESS OF, in these volumes.

CONGRESS OF THE UNITED STATES, the legislative department of the national government. It is composed of two houses, a Senate and a House of Representatives. (For description of each house, see REPRESENTATIVES, HOUSE OF; SENATE).

The various Congresses of the United States are designated by number, and the life of each Congress is two years. Prior to 1933, Congress began its life on March 4 of odd-numbered years; the Congress which began March 4, 1929, and extended to March 4, 1933, was the Seventy-second Congress. Members of the House of Representatives are elected in November of even-numbered years. By the provisions of the Twentieth Amendment to the Constitution, proposed in 1932, and adopted in January, 1933, the terms of members of Congress, both Representatives and Senators, shall hereafter begin at noon on January 3, instead of March 4, as heretofore. The life of a Congress is the length of the term of the Representatives. The Senate is a continuous body; one-third of its members are elected in November of even-numbered years, for a six-year term.

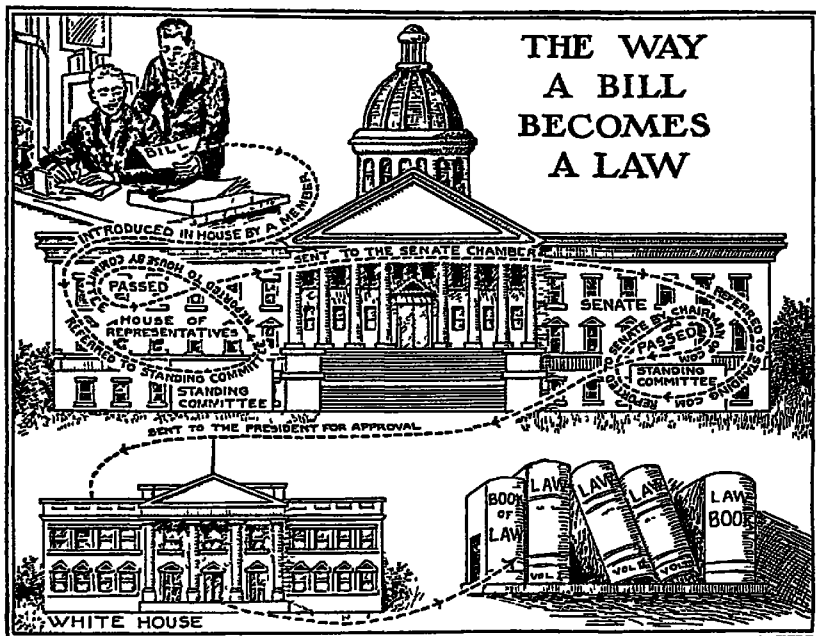
The Twentieth Amendment provides that "the Congress shall assemble at least once in every year", and it may, if necessary, remain in session a full year—up to the date of the opening of the next regular session in the following January, but in ordinary times adjournment occurs at a much earlier date. When the terms of the members of the House of Representatives expire, newly elect-

ed members come forward to form the next Congress

Congress is one of three coordinate departments of the national government, the others being the executive and judicial departments, and its powers are clearly set forth in the Constitution of the United States, Article I, Section 8 (see CONSTITUTION OF THE UNITED STATES). The salary of each member of Congress, excepting the presiding officer of each house, is \$10,000 per year. The Vice-President, who presides over the Senate, receives

progress of a bill from the desk of the Representative who prepared it, through the House of Representatives into the standing committee and back to the House, where it is passed; thence to the Senate, eventually to the White House for the President's signature, and thus becomes a law of the land.

Committees of Congress. A great many thousand bills are introduced into Congress at each session and it would be manifestly impossible for the Houses in open session to give consideration to even a very small



\$15,000, and the Speaker of the House of Representatives receives \$12,000.

How a Bill Becomes a Law. A formal statement of a proposed law is called a *bill*, and under this name is introduced either into the Senate or House of Representatives for passage. To become a law a bill must pass both Houses of Congress and be signed by the President, or be returned by the President without his signature to the House in which it originated, and passed again by both Houses by two-thirds' majority. If passed, it then is called an *act*. The following illustration graphically outlines the

portion of them. Committees are therefore named in each House whose duty it is to give particular consideration to such proposed legislation as shall be referred to them. For instance, a bill proposing that a territory be admitted as a state would be sent in each House to the committee on Territories. After a committee has given a bill due consideration, it reports to the House in regular session the result of its deliberations and either suggests that the House pass the bill, or that it be not passed. The recommendation of a committee is usually accepted, although this is not the invariable

rule. After a bill has passed one House and goes into the other, the second House may amend it in any particular, should it so desire, in which event in its amended form the bill must return to the House where it originated and be voted on again in its new form. If the two Houses cannot agree as to the final form a bill is to take, a conference committee of both Houses is usually appointed, and its decision is nearly always accepted.

Powers of Congress. The Constitution definitely prescribes what powers Congress may exercise. It names other powers by implication, and still others that are prohibited or in the exercise of which Congress is restricted. The following outline explains the three divisions:

I Express Powers.

1. To lay and collect taxes
2. To borrow money on the credit of United States
3. To regulate commerce
4. To establish a uniform rule of naturalization.
5. To establish uniform laws of bankruptcy.
6. To coin money and regulate its value.
7. To fix the standard of weights and measures.
8. To provide for punishment of counterfeiting
9. To establish postoffices and post roads
10. To grant patents and copyrights.
11. To establish inferior United States courts.
12. To have charge of matters related to war.
13. To exercise control over United States territory.

II. Implied and Incidental Powers.

1. To purchase foreign territory.
2. To establish military and naval academies.
3. To make internal improvements
4. To create corporations
5. To make all laws necessary to carry into effect all powers.

III. Powers Prohibited or Restricted

1. To suspend the writ of habeas corpus.
2. To pass a bill of attainder.
3. To pass an ex post facto law.
4. To lay direct taxes unless in proportion to the census
5. To lay taxes on state exports
6. To give preference to the ports of one state over those of another
7. To compel vessels to enter any port other than the one bound for
8. To draw money from the treasury without lawful appropriations being made.

9. To grant titles of nobility.
10. To abridge freedom of speech or of the press
11. To establish religion or prohibit its exercise
12. To deny the right of assembling to petition the government.
13. To confiscate private property.

CONGREVE, WILLIAM (1670-1729), an English dramatist. His plays belong to the artificial school of comedy, which aimed rather at the production of a sustained flow of wit than at the precise delineation of character. The immorality by which they are marred is perhaps the fault of the age rather than of Congreve. The most important of his plays as viewed to-day are *The Old Bachelor*, *Love for Love* and *The Mourning Bride*.

CONIFERAE, *konifereæ*, or **PINE FAMILY**, a large group of trees and shrubs which are found in the north and south temperate regions, and sparsely within the tropics. By the peculiar structure of their flowers they are separated widely from most of the flowering plants, and with three other small families they are known as gymnosperms. The trees have a somewhat uniform habit of growth. Usually the branches grow out horizontally and diminish in length toward the top, giving a conelike appearance to the whole tree. The leaves are slender and needlelike, or in the form of flat scales; and as on many species they persist through the winter, they have earned for the trees the names of *evergreens*. The name *coniferae*, or cone-bearing, is given these trees because of their peculiar fruit, which is cone-shaped and composed of heavy scales, under which are borne the seeds.

In some species these are long in ripening, and the scales cling firmly together until the seeds are ready for distribution, when the scales open and the seeds are blown about by the wind. The stamens are borne in small and usually inconspicuous cones, which fall as soon as the pollen has been distributed by the wind. They are so removed from the fertile cones that the latter can be fertilized only by the wind, and in consequence the yellowish pollen is composed of countless minute grains which fly about as a yellow dust. Not all the *coniferae*, however, bear cones. Some, as the juniper, form berries. Some species are very widely scattered, while others are closely restricted to certain localities.

Related Articles. Consult the following titles for additional information.

Cypress	Pine
Fir	Sequoia
Hemlock	Spruce
Larch	Yew

CONJUNCTION, *kon jŭn'k'shun*, in astronomy, the position of two of the heavenly bodies, as two planets, or the sun and a planet, when they are in the same direction from the earth. Sometimes one appears to cover the other, or the two appear to occupy the same spot in the heavens; and when this happens with the sun and the moon we call the phenomenon an *eclipse*. When a star and the moon are in conjunction it is called an *occultation*. When it is simply said that a planet is in *conjunction*, conjunction with the sun is to be understood. The planets nearer to the sun than the earth are said to be in *superior conjunction* or *inferior conjunction*, according as the sun is between them and us, or they are between the sun and us.

CONJUNCTION, in grammar, the part of speech which connects words, phrases, clauses and sentences. They are of two kinds: *coordinate conjunctions*, which connect elements of the same rank, as "The army rushed forward *and* fell upon the enemy," and *subordinate conjunctions*, which introduce dependent clauses, as "They could not advance *because* the bridges were destroyed." Conjunctions which are used in pairs, as *both—and*, *not only—but also*, are called *correlative conjunctions*. See LANGUAGE AND GRAMMAR.

CONJUNCTIVITIS, *kon jŭn'k'ti v'itis*, or **OPHTHALMIA**, *of thal'mi'a*, an inflammation of the mucous membrane of the eye socket and the outer surface of the eyeball. There are a number of distinct varieties of the disease, occasioned by differing causes. These varieties vary from the slight inflammation caused by an acute attack of catarrh to a purulent form that is highly contagious and frequently destroys vision. *Granular conjunctivitis*, or, as it is usually known, *granular lds.*, is a contagious trouble, which is readily communicated by towels or wash basins that are not carefully cleaned. This is a common disease in crowded prisons or even in schools that are carelessly supervised.

It need not be acquired by a person who is habitually cleanly and careful in the use of public towels or bathing places, and the disease is promptly curable if intelligent measures are taken. Any eye trouble should have the attention of a reliable oculist.

Infection of the eyes of new-born infants

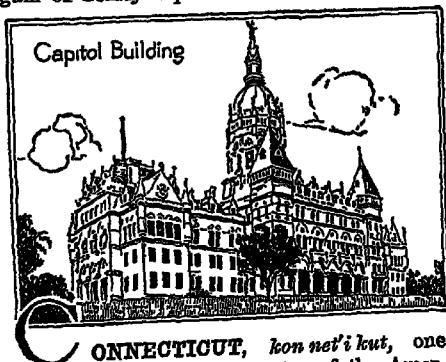
frequently assumes a form called *Ophthalmia neonatorum*. Its chief symptoms are discharge of pus and badly-swollen lids. Solution of silver nitrate, applied by a competent nurse or doctor, should be administered at once. Neglect causes total blindness.

CONKLING, Roscoe (1829-1888), one of America's greatest statesmen of the last half of the nineteenth century, was born in Albany, N. Y. In 1850 he was admitted to the bar and in the same year became district attorney for Oneida County. In 1858 he was elected mayor of Utica and within a few months was rewarded for long political activity by nomination and election to Congress. He served several terms, and in January, 1867, took his seat in the United States Senate, being reelected in 1873 and in 1879. He vigorously supported Grant in his campaign for the Presidential nomination in 1880, and he was extremely hostile to President Garfield's administration, claiming, with his colleague, Thomas C. Platt, the right to control Federal appointments in his state. They finally resigned their seats in the Senate and appealed to the legislature of New York for a reelection as a vindication of their course, but they were unsuccessful. Conkling later declined the nomination of Justice of the United States Supreme Court.

CONNAUGHT, *kon'navt*, ARTHUR WILLIAM PATRICK ALBERT, Duke of, (1850-), son of Queen Victoria, and a Governor-General of Canada, was born at Buckingham Palace on May 1, 1850. He entered the Royal Military Academy, Woolwich, at the age of sixteen and at eighteen was assigned to the Royal Engineers. He then served for a few months with the Royal Artillery, and in August, 1869, was transferred to the Rifle Brigade. He was promoted captain in 1871 and successively won promotion to major, lieutenant-colonel, colonel, major-general and to the rank of general in 1893. In Egypt, in 1882, he commanded the Guards Brigade at the battle of Tel-el-Kehir. He was mentioned several times in despatches, was made Companion of the Bath, and was thanked by Parliament. From 1886 to 1890 the duke was in active command of the Bombay army in India; from 1890 to 1898 he was district commander at home, first of the southern district, later of the Aldershot district. He succeeded Lord Roberts in 1900 as com-

mander-in-chief of the forces in Ireland. Four years later, when the war office was reorganized, the duke was appointed to the newly created office of inspector-general of the forces, which he held until 1909, when he became commander in chief in the Mediterranean. He remained stationed at Malta for two years and then returned to England. On October 13, 1911, he became Governor-General of Canada, retiring in 1918.

CONNEAUT, *kon ne awt'*, OHIO, in Ash-tabula County, sixty-two miles northeast of Cleveland, near the Pennsylvania state line, on Conneaut Creek, which forms a good Lake Erie harbor, and on the Lake Shore & Michigan Southern, the Nickel Plate and Bessemer & Lake Erie railroads. The first white settlers of Northern Ohio landed here in 1796, and the town was incorporated as a village in 1832. Vast quantities of iron ore are received here from the Minnesota-Michigan fields. The place contains railroad shops, and canning and other factories. Population, 1920, 9,343; in 1930, 9,691, a gain of nearly 4 per cent.



CONNECTICUT, *kon net'i kut*, one of the original thirteen states of the American Union, and one of the smallest in area, larger only than Rhode Island and Delaware. It is popularly called the NUTMEG STATE, because of a legend that once an unscrupulous Connecticut manufacturer made and sold wooden nutmegs. Another name for it is THE LAND OF STEADY HABITS, a compliment to its conservative people from colonial times. The name of the state is from an Indian term meaning *long river*, referring to the Connecticut River, which flows through it from north to south. The state flower is the mountain laurel.

The area of Connecticut is 4,965 square miles, of which 145 square miles are water.

The population in 1920 was 1,380,585, which had increased to 1,806,903 by the Federal census of 1930. There were, in 1930, 333 people to the square mile, while the entire United States averaged but 41 in each square mile. Six per cent of the population over ten years of age is classed as illiterate, being unable to write; this is largely due to the presence of large numbers of foreigners.

The People. Connecticut is a manufacturing state, hence the people live largely in cities. One-third of the state's inhabitants are in four cities—New Haven, Bridgeport, Waterbury and Hartford. Many foreigners are in these cities. About one-third of the people are of native parentage; an equal number are native born of foreign parentage, and the remainder, excepting 15,000 negroes, are foreign-born.

Surface. Connecticut occupies the southern slope of the hill region of New England, and its surface includes three great river valleys, which cross the state from north to south and are separated from one another by ranges of low hills. In the eastern part of the state is the valley of the Thames, which with its two tributaries drains this part of the state into Long Island Sound. The Connecticut valley occupies the central part of the state. The western part of the state is traversed by the Berkshire Hills, which are a continuation of the range crossing Massachusetts. The Housatonic river valley, with the Naugatuck and other tributary streams, drains this western section. There are a number of low mountains in this region, the highest being Bear Mountain, which attains an altitude of 2,354 feet. Other peaks worthy of mention are Gridley Mountain, Riga Mountain, Bradford Mountain, Dutton Mountain and Mount Ball. The southern portion of the state along the coast is quite low and level, but inland the surface is everywhere characterized by low hills, all of which are more or less stony. Along the streams are narrow, level flood plains, usually called meadows.

Climate. The climate is subject to sudden changes, the winters are quite severe and among the hills and mountains the snows are usually deep. The summers are hot. The rainfall is everywhere sufficient. The climate is considered healthful, and the pleasantest season is autumn.

Mineral Resources. Hematite occurs in a

number of places, and some of the iron mines have been worked since 1732. There are also small deposits of lead, nickel, cobalt and other metals, but not in sufficient quantities to pay for working. The brown sandstone, known as brownstone, and valued so highly for the construction of residences, is quarried near Middletown. There are also quarries of granite, marble, flagstone, feldspar and stone suitable for the manufacture of lime and cement. The annual output of mineral products is about \$3,300,000.

Agriculture. Agriculture is not a leading industry, but the soil in general is fertile, and most of it is tilled. The chief crops are corn, oats, potatoes, hay and tobacco. The nearness to New York and other large cities affords the Connecticut farmer a good market for garden produce, and truck farming is quite extensive along the streams. Dairying is also an important industry. The tobacco crop is the most remunerative of all agricultural products, being worth to the growers about \$11,000,000 each year. Corn is next, worth about \$2,000,000.

Manufactures. Connecticut is one of the leading manufacturing states of the Union. According to government statistics it produces more than half of the brass products, more than sixty per cent of the clocks, nearly half of the hardware, over three-fourths of the plated and britannia ware and nearly sixty-five per cent of the needles and pins made in the United States. Besides these industries, others which have attained large proportions are the manufacture of rubber goods, textiles, including cottons, woollens and silk fabrics, and machinery. New London has long had an extensive shipbuilding plant, where some of the largest steamers afloat have been constructed. The development of Connecticut's manufacturing industries is due to her favorable location in reference to large cities, and to the abundance of water power.

Airplane engines and other parts for airplanes are made in Connecticut factories, particularly in Hartford and Bridgeport. Ball bearings and other metal parts for automobiles are produced in large quantity.

Transportation. The Connecticut River is navigable for steamers to Hartford, and beyond for small boats, and the Thames is navigable as far as Norwich. The state contains 995 miles of railway, nearly all of

CONNECTICUT NUTMEG STATE



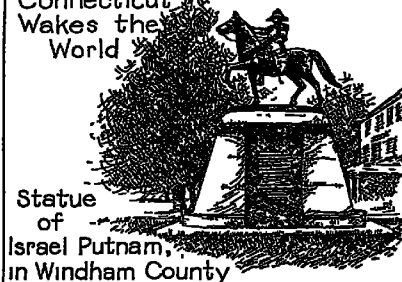
State Seal



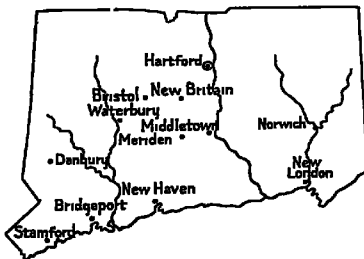
Mountain Laurel,
State Flower



Connecticut
Wakes the
World



Statue
of
Israel Putnam,
in Windham County



Items of Interest on Connecticut

The Connecticut valley has the most fertile land in New England.

Garnet and quartz are quarried in large quantities in the western part of the state for sandpaper and polishing purposes.

Connecticut produces three-fourths of the tobacco crop of New England, and in value ranks fifth among the states of the Union.

Other important agricultural products are hay, potatoes, orchard fruits, and eggs.

Connecticut formerly led all other states in the production of fur hats, generally known as "derby" and "soft" hats, but it is now second to Pennsylvania. This industry is centered in Danbury, Norwalk and Bethel.

The leading industry of Connecticut is the production of rolled brass and copper, in which it ranks first among the states of the Union.

It is also first in the production of hardware, plated and britannia ware, brass castings and brass finishings, clocks, watches and corsets.

It is second in the manufacture of sewing machines and attachments, cutlery and edge tools, and rubber goods.

Connecticut leads the United States in the special manufacture of small wares such as lamps and reflectors, needles and pins, buttons, and bells, screws and hardware.

Questions

What is the area of Connecticut?
Which states are smaller?

What are the principal rivers?

What are the chief agricultural products?

How does Connecticut rank in the production of "derby" and "soft" hats? Clocks? Cutlery? Boots and shoes? Sewing machines?

What can you tell about Hartford, Bridgeport, Waterbury, Ansonia?

What is the importance of New Haven? What are some of its manufacturing industries?

When was Yale University founded?

which is owned or leased by the New York, New Haven & Hartford system. This road owns or controls 850 miles of track. Electric railways are found in all the important towns, and the state maintains over 9,000 miles of highway. The numerous inlets on the coast provide good harbors, and New London, New Haven, and Bridgeport are important ports. The state carries on an extensive commerce, owing to its great variety of manufactures.

Education and Institutions. Connecticut maintains a good system of public schools, supported in part by income from the state school fund and in part by local taxation. There are normal schools at Danbury, New Haven and Willimantic, and a teachers college at New Britain. Connecticut State College is located at Storrs, and among higher institutions of learning the most noted are Yale University at New Haven, Wesleyan University at Middletown, Trinity College at Hartford, and Connecticut College for Women at New London.

The state maintains a hospital for the insane at Middletown and a school for the feeble-minded at Lakeville, also two institutions for the deaf and one for the blind. There are also numerous hospitals and sanitariums, and each county has a temporary home for the indigent. The state's prison is at Wethersfield, and there are reformatories at Meriden, Cheshire, Hartford and New Haven. All of these institutions are under the supervision of a state board of charities.

Cities. The largest city of Connecticut is Hartford, which had a population of 164,072 in 1930, according to the Federal census. The next five cities, in order of size, were New Haven (162,655), Bridgeport (146,716), Waterbury (99,902), New Britain (68,128), and Stamford (46,346).

Government. Connecticut has been organized since 1637. In 1639 a constitution was adopted which, it is claimed, was the first in the world formed by a social compact. This constitution was confirmed by Charles II in 1662. It was replaced by a state constitution in 1818.

The general assembly consists of a Senate of thirty-five members and a house of representatives of 258 members. The state officers are a governor, lieutenant-governor, secretary of state, treasurer, comptroller, attorney-general, adjutant-general and commissioner of insurance. The term of office is two

years. The supreme court consists of a chief justice and four associate justices.

History. The territory of Connecticut was granted to the Plymouth Company in 1606 and was explored by the Dutch in 1614. In 1623 they established a trading post at Hartford. Meantime, the English had become interested in the region, and in 1631 the land from Narragansett Bay to the Pacific was granted to Lord Say and Sele, who soon afterward founded Saybrook. Early in 1636 Thomas Hooker led his congregation westward from the coast and settled at Windsor, near Hartford. Others followed and established English towns in the neighborhood. English Puritans founded a settlement at New Haven in 1638, which was to be governed largely by the Scriptures.

Both the Connecticut and New Haven settlements expanded, and the former became known as one of the most prosperous and liberal of the New England colonies. Connecticut absorbed New Haven in 1662. In the struggle against the Crown to obtain the charters, Connecticut took a prominent part, and when Governor Andros appeared in 1687 to demand the charter, it was hidden away until 1693. In the French and Indian Wars Connecticut took an active part, and, also, in the pre-Revolutionary discussion. The state furnished the Continental army about 30,000 men, was one of the first to form an independent government (1776); the war governor, Jonathan Trumbull, was one of the closest friends and advisers of Washington.

Connecticut suffered through raids against its defenseless towns, the last one being directed by the traitor Benedict Arnold, in September, 1781. Its representatives, Sherman, Johnson and Ellsworth, were prominent in the Constitutional Convention and proposed the present system of representation by states in the Senate and according to population in the House of Representatives. Connecticut opposed the War of 1812 and was prominent in the Hartford Convention in 1814.

The sentiment of the state was against slavery and in favor of union, when the crisis in the slavery struggle came. The war governor, Buckingham, was a prominent figure in the period. Hartford and New Haven were long the joint capitals of Connecticut, but the former became the sole capital in 1873.

Related Articles. Consult the following titles for additional information.

Ansonia	New Britain
Berkshire Hills	New Haven
Bridgeport	New London
Bristol	Norwich
Charter Oak	Stamford
Connecticut River	Torrington
Hartford	Waterbury
Hartford Convention	West Haven
Meriden	Willimantic

CONNECTICUT RIVER, the largest river in New England. It rises on the north border of New Hampshire, forms the boundary between Vermont and New Hampshire, passes through the west part of Massachusetts and the central part of Connecticut and falls into Long Island Sound. It is about 375 miles long and drains an area of over 1,100 square miles. It is navigable for large steamers for about fifty miles from its mouth. Its chief branches are the Passumpsic, White, Deerfield, Farmington and Chicopee rivers.

CONNECTIVE TISSUE, one of the elementary structures of the body. It forms the bones, cartilages, ligaments and a framework for nervous, glandular and muscular tissue. Connective tissue includes the areolar, adipose, retiform, white fibrous, yellow elastic, cartilaginous and osseous. The *areolar* tissue is widely distributed, as it is found in the true skin, in the outer sheaths of blood vessels and in the mucous membranes. It makes the sheaths for glands, nerves and muscles and connects the finest parts of the different organs. It is composed of bundles of fine fibers, interlacing in every direction. *Adipose*, or fatty, tissue, occurring in nearly all parts of the body, but most abundant under the skin and around the kidneys, is not found in the substance of the lungs and some other organs. It exists in small lobules, or masses, surrounded by areolar tissue. No nerve fibers terminate in the fatty tissue, but it contains blood vessels.

White fibrous tissue is arranged in wavy parallel bundles which give to the surface of tendons the appearance of watered silk. It constitutes the tendons of the muscles, the ligaments around joints, is found in the periosteum, pericardium, the largest tissues around the muscles and the sclerotic coat of the eye. *Yellow elastic* tissue, as its name implies, is very elastic and can often be extended sixty per cent of the length before breaking. It is found in the skin, the trachea, the true vocal cords and in veins. *Cartilaginous* tissue differs from other connective tissue in density and is composed of cells

imbedded in a substance called the matrix (see CARTILAGE). It contains no nerves. It furnishes attachment for muscles and ligaments, binds bones together and keeps the larynx and trachea in their tubular shape. *Ossseous* tissue makes the solid part of the bone (see BONE).

CONNELLVILLE, *kon'els vil*, PA., a city in Fayette County, fifty-six miles south-east of Pittsburgh, on the Baltimore & Ohio, the Pennsylvania and the Western Maryland & Lake Erie railroads and on the Youghiogheny River. It is in the center of a region noted for its coke, coal and natural gas. The industries center around these, and there are also glass works. A Federal building was erected in 1912; there is a Carnegie Library, and the city has two hospitals. Population, 1920, 13,804; in 1930, 13,290, a loss of 4 per cent.

CON'NOB, RALPH. See GORDON, CHARLES WILLIAM.

CONRAD, JOSEPH (1857-1924), an English novelist, born in Poland, where he passed his youth. At the age of seventeen, on the death of his father, he went to Marseilles, and served on French ships in the Mediterranean for two years. In 1878, he went to England, and for the next four years rose from able seaman to master on British ships. He acquired such facility in the use of the English language that he adopted it as the medium of his literary work. His novels display a strong and idiomatic style and vivid powers of description. They present vivid pictures of seafaring life in the East and elsewhere.

His first novel, *Almayer's Folly*, appeared in 1895. Among his later works were the following: *An Outcast of the Islands* (1896); *The Children of the Sea* (1897); *Lord Jim* (1900); *Typhoon* (1902); *The Mirror of the Sea* (1906); *Point of Honor* (1908); *Chance* (1913); *Notes on Life and Letters* (1921); *The Rover* (1923); and *Under Western Eyes* (1923). *A Life of Conrad* by Ford Madox Ford appeared in 1924.

CONSCIOUSNESS, *kon'shus nes*. See PSYCHOLOGY.

CONSCRIPTION, *kon skrip'shun*, or **DRAFTING**, terms signifying the enrollment of men for military service by compulsion. In Europe the principle of compelling all citizens to undergo military training and of inducting them into the army for active service in time of war is quite generally accepted, but previous to the World War England

resorted to the volunteer system to keep up its relatively-small armies. The various modifications of the conscription system as it is applied in Europe will be found in the article ARMY. In most countries the naval service is maintained by means of volunteers, but this is a matter of sentiment. There is no reason why the conscription principle should not be applied to the navy as well as the army.

Traditionally, the American people have always opposed universal military service, which is conscription in a broad sense, but drafting was resorted to as necessary in the Revolutionary, the Civil, and the World wars. During the Civil War serious draft riots occurred in New York in opposition to conscription, but this opposition was soon crushed. The nation had no cause thereafter to resort to conscription until its entrance into the World War, in April 1917. It was realized then that the existing military machinery was wholly inadequate to the situation, and in May Congress passed the Selective Conscription Bill, which provided for the registration of all men between the ages of twenty-one and thirty, inclusive.

Under the operation of this law, which the country accepted with remarkable unanimity, 2,400,000 men had been inducted into service and received training up to August, 1918. In that month a second law was passed providing for the registration of men between eighteen and twenty-one and thirty-one and forty-five inclusive.

Canada adopted conscription in 1917. The act provided for conscription up to the number of 100,000 men. The act was not popular in the province of Quebec and enlistment was slow, until March, 1918. At that time certain exemptions were cancelled, although opposed by the farming interests. The name "conscript" was changed to "draftee," and the quota was soon filled. See WORLD WAR.

Some Facts Conscription Developed. Every young man drafted into the army of the United States in 1917 and 1918 was subjected to a rigid physical examination. Almost one-third of them were rejected as unfit for military service, on various physical grounds—flat feet, defective eyesight, impaired hearing, unsound lungs, organic heart trouble. Many thousands of the drafted men—these being mostly of foreign birth or parentage—could not read English well enough to understand routine orders.

Thus conscription taught the lesson that intelligent citizenship and good health is a greater guarantee of peace and equality than guns and trained soldiers

The peace conference, in Paris, which settled the issues of the World War, determined that conscription should be abandoned in all countries, but the agreement was ignored later in countries under dictators

CONSERVATION. Until within recent years the attention of Americans had never been directed to the great waste that has taken place in connection with the country's natural resources. Half of the contents of coal mines has been wasted in mining; forests have been carelessly cut over and have been burned; water power has not been utilized or has been given to private enterprises and thus closed to the use of all the people. These first two gifts of nature have been used as freely as though the supply were exhaustless, and the third has been largely ignored by the general public, but there has come an awakening to the necessity of remedying the reckless waste that has already jeopardized the future.

Another element to be recorded in conservation is preservation of soil fertility. It ranks in importance with the other three. This would appear to be vital only to the agricultural community, but really it affects in no uncertain way every citizen, for we are all dependent upon the products of the soil for our existence.

National interest in conservation began in 1908, in which year President Roosevelt called a conference of the governors of all the states and other representative men to meet in Washington to consider measures for preserving the public lands, streams, forests and minerals from monopolies and from unnecessary waste. Following this meeting, on June 8 the President appointed a national conservation commission, consisting of 48 members, representing all the states. This commission organized with Gifford Pinchot as chairman, and was divided into the following sections: water resources, land resources, forest resources and mineral resources. A commission was also appointed to devise plans for the cooperation of state governments with the national government.

One of the immediate results of this study of the nation's resources was an order of the President withdrawing public lands from possible purchase by private interests to the ex-

tent of almost 235,000,000 acres, so that the natural riches in them might be conserved for the future. Since then other millions of acres have been saved from waste in like manner. On many areas not all rights have been retained by the government; surface rights may be retained, or mineral, or water rights, while one or more of the others have been allotted to private interests under proper safeguards.

The Natural Conservation Association was organized in 1909, and has permanent headquarters in New York City. Its purpose is to unite in one great national organization all who take an active interest in the conservation movement.

CONSERVATIVE, *kon sur'va tiv*, in Great Britain and Canada, the political party which favors the maintenance of existing conditions rather than the introduction of radical reforms, when such conditions are in the main satisfactory. The Conservatives in England are the successors of the Tories. See **LIBERAL**; **TORY**.

CONSERVATORY, *kon sur'va tori*, a school giving instruction in all branches of music. Conservatories were originally benevolent establishments attached to hospitals, charitable or religious institutions. In France the musical school established in connection with the Opera in 1795, under the name of *Conservatoire de Musique*, is now the most famous school of music in the world. The Conservatorium at Leipzig is perhaps the most influential in Germany. The most noted American conservatories are the National Conservatory in New York, the New England Conservatory in Boston and the Peabody Institute in Baltimore. The name is also applied in America to a botanical garden or other collection of flowers and shrubs.

CONSOLE, in architecture, a projecting ornamental bracket, often in the form of a scroll or letter *S*. It is employed to support a cornice, bust, vase or the like, but it is an almost purely decorative element. See **CORBEL**.

CONSONANT, *kon'so nant*, a letter so named because it is usually sounded in connection with a vowel. Some consonants have hardly any sound, even when united with a vowel, serving then merely to determine the manner of beginning or ending the vowel sounds; as in *ap*, *pa*, *at*, *ta*. In uttering a consonant there is always greater or less

obstruction of the breath by the organs of speech; in uttering a vowel the vocal passage is open, though modified in shape. Because *s*, *x* and *v* are consonants not requiring connecting vowels, they may be considered semivowels. See **VOWEL**.

CON'SORT, a term derived from the Latin *consors*, meaning *partner*. It is used most commonly to designate the husband or wife of a ruler; for example, it is the title of Duke Henry of Mecklenburg-Schwerin, husband of Wilhelmina of Holland. Prince Albert, the husband of Queen Victoria, was known officially as Prince Consort. The power of a royal consort is usually defined by the legislative body of the nation. This precaution is deemed necessary, since the consort is generally a foreigner.

CONSPIRACY, in law, a combination of two or more persons to accomplish an unlawful purpose or a lawful purpose by unlawful means. According to modern statutes it is necessary, in order for the offense to be complete, that some open act to accomplish the object of the conspiracy be committed. To be guilty of conspiracy it is not essential that the object of the conspirators be accomplished. Proof of interest is sufficient. In this case the offense amounts to a felony, and is punishable by imprisonment.

CONSTABLE, *kun'sta b'l*, the title applied to the chief constabulary officer or peace officer of a township; he is elected by the voters annually or biennially. Usually there is a constitutional provision for four constables in each township of a state. They are charged with the maintenance of the public peace and in the prosecution of their duties they arrest offenders, serve warrants, execute writs, etc. The name comes to us from medieval times, where the constable was the keeper or governor of a castle under the sovereign. Later, an officer bearing this title was the first military adviser of the king, and, in the latter's absence, commander in chief of the army. In England, at a date nearer the modern era, the constables had oversight of the king's peace in their several districts.

CONSTANCE, *kun'stahnts*, **LAKE**, a lake in Central Europe at the north base of the Alps, bounded by Switzerland, Austria and the German states of Bavaria, Baden and Wurttemberg. It extends northwest and southeast, and at its northwest extremity it divides into two branches, the north being

called Ueberlingen See, and the south, Unterseel, or Zeller See. The Rhine enters it at the south and flows out at the northwest. Lake Constance is about forty miles long and nine miles wide, and is about 1,300 feet above sea level. It is subject to peculiar risings and falls, which occur suddenly and unexpectedly.

CONSTANTINE, *kun'stan tne*, **ARCH** OF, a triumphal arch in Rome, dedicated to Constantine, in 315, in memory of his victory over Maxentius. It is the best preserved specimen of ancient Roman monuments, having escaped the ravages of the Middle Ages, probably because Constantine was a Christian emperor.

CONSTANTINE, CAIUS FLAVIUS VALERIUS CONSTANTINUS (274-337), a Roman emperor, surnamed *The Great*. After the death of his father, Constantine Chlorus, in 306, he was chosen emperor of the West by the soldiery and in 325 he became the sole head of the Roman Empire. His administration of internal affairs was marked by a wise spirit of reform and the adoption of Christianity as the state religion. In 329 he removed his capital from Rome to Byzantium, which was called after him Constantinople (see **CONSTANTINOPLE**). In 337 he died near Nicomedia, leaving his empire to be divided among his three sons, Constantine, Constantius and Constans.

CONSTANTINE I, *kun'stan teen* (1868-1923), king of Greece from 1913 to 1917, and from 1920 to 1922. He was the son of George I (which see). In 1889 Constantine married the Princess Sophia, sister of Emperor William II of Germany. Having entered the army, he rose to important commands, and in the war of the Balkan allies against Turkey (1912-1913), his personal bravery and the brilliant successes of his troops made him a public idol. At the outbreak of the World War Constantine had to face many serious problems, and his efforts to keep the country neutral led to a rupture with the pro-ally faction, headed by Venizelos. Finally, in June, 1917, the Venizelists gained the upper hand and forced Constantine to abdicate in favor of his second son, Alexander. He was restored in 1920, but in 1922, following war with Turkey in Asia Minor, he was forced to abdicate again, his eldest son, George, succeeding him. See **GREECE**, subhead *History*; **WORLD WAR**; **GEORGE II** (Greece).



CONSTANTINOPLE, *konstan ti no'pl*, a celebrated city on the southeastern boundary between Europe and Asia, for over four centuries after 1453 the capital of the Turkish Empire. In 1918, at the close of the World War, Constantinople was occupied by the allies, but the Sultan was allowed to remain, as the head of the Turkish government. In November, 1922 the Grand National Assembly, meeting at Angora in Asia Minor, deposed the Sultan, and Constantino-

ple ceased to be the capital of Turkey, and its name was changed to Istanbul.

Constantinople occupies a picturesque site on a promontory which juts into the Sea of Marmora. Stamboul, the site of the first settlement, and the Mohammedan center, lies on the south shore of the Golden Horn, a long, narrow inlet of the Bosphorus; the latter is the historic strait which connects the Sea of Marmora and the Black Sea. On the north and opposite shore of the Golden Horn lie the suburbs of Galata and Pera, the former a business section, and the latter the modern quarter of the foreigners. Scutari, which is governed as a part of the political district of Constantinople, is a suburb on the Asiatic side of the Bosphorus. On three sides Stamboul is surrounded by water, and the fourth and land side is guarded by a double wall erected in 447 by the Emperor Theodosius. The city has thus an admirable situation for commerce and for defense. It has been coveted for centuries by all the European powers, and the alliance of Turkey with Germany in the World War made it a German gateway to the East.

Constantinople of To-day. This great Mohammedan stronghold is often called a "queen of cities," but for many years it was a very unsightly queen. Its more than 300 mosques gave it a most picturesque skyline, but its streets were narrow, dirty and unsanitary, and modern improvements were entirely lacking. Since the revolution of 1908-1909 much progress in modernization has been made. Many dreary wooden buildings have been replaced by cement structures,

a splendid granite-paved bridge joins Stamboul and Galata, and the sounds of electric cars and motor trucks are heard in the streets. In Pera there are many fashionable shops, a striking contrast to the Oriental booths of the Grand Bazar in Stamboul, which has lost some of its former prestige. Of the mosques, the most famous is that of Saint Sophia, converted into a mosque in 1453, and in 1923 renamed Mosque Mehmedie (Mosque of Mahomet). Another magnificent mosque is that of Solyman. Besides these, there are the mosques of the Sultana Valide, built by the mother of Mohammed IV, and of Sultan Ahmet, one of the most conspicuous objects in the city.

Other interesting features are the Museum of Antiquities, in Seraglio Park; the group of government buildings known as the Sublime Porte, the Serpent Column, which the Emperor Constantine brought to the city from Delhi; and a number of fine aqueducts connected with some of the largest underground reservoirs in the world.

In Constantinople there have been middle-class schools for boys for a number of years, and in 1918 five similar institutions for girls were established. A university, founded in 1900, and reorganized in 1918, comprises schools of arts, theology, law, medicine and science. A modern building occupying the Scutari shore of the Bosphorus houses the medical department. Robert College is an American institution for men, and there are, besides, various special schools.

Industrially, Constantinople is known for its handmade goods. Factory products are made up chiefly of tobacco goods, iron wares and fezzes. In normal years the export and import trade is immense, as the great harbor, the Golden Horn, can accommodate over 1,000 of the largest ocean liners. There is direct railroad connection with the rest of Europe, and ferry and steamship service is maintained for local transportation. No exact population figures were known before 1927, but in that year its population was reported as 690,857; with suburbs, 794,444.

History. In mythology the site of Constantinople was reached by the Argonauts, but the first historic event was the founding of a town called Byzantium, by Greek adventurers six centuries before Christ. Darius II invaded the region in 513 B. C., but was only in temporary control of the settlement. The Emperor Constantine, inspired

by the commercial and strategic advantages of the site, selected the place as the capital of his empire in 330, and named it Constantinople (see *BYZANTINE EMPIRE*).

During the Crusades the city was twice conquered by the Christians, but in 1453 the Turks captured it once for all. At that time hundreds of Greek scholars fled to Christian Europe, and their flight had an important influence on the revival of learning. Then for centuries Constantinople was an important feature of international politics, with the European nations playing against each other and all striving to gain control of this gateway to the East. In 1915 the Allies made a determined effort to capture it by way of the Dardanelles, which joins the Sea of Marmora and the Aegean Sea, but the result was a costly failure. With the rise of Mustapha Kemal Pasha, who organized the republic (1922), the abolition of the Caliphate, and removal of the capital to Ankara, Constantinople's glory was dimmed.

Related Articles. Consult the following titles for additional information.

Byzantine Empire	Seraglio
Constantine	Sophia, Church of
Dardanelles	Saint
Renaissance	Turkey

CONSTELLATIONS, *kon stel a'shuns*, the groups into which astronomers have divided the fixed stars, and which have received names for convenience in description and reference. It is plain that the union of several stars into a constellation, to which the name of some animal, person or inanimate object is given, must be entirely arbitrary, since the several points (the stars) may be united in a hundred different ways, just as imagination directs. The grouping adopted by the Egyptians was accordingly modified by the Greeks, though they retained the Ram, the Bull, the Dog and others. The Greek constellations were again modified by the Romans, and again by the Arabians. At various times, also, Christianity has endeavored to supplant the pagan system, the Venerable Bede having given the names of the twelve apostles to the signs of the zodiac, and Judas Schillerius having, in 1627, applied Scripture names to all the constellations. The old constellations have, however, been for the most part retained.

The different stars of a constellation are marked by Greek letters, α denoting those of the first magnitude, β those of the second and so on. Stars of the sixth magnitude are the smallest visible to the naked eye. Several

stars in a constellation may have also particular names.

This subject is treated more fully in the article *ASTRONOMY*, in which there are charts showing the chief constellations. See, also, *ZODIAC*, *BEAR*, *GREAT*, *CASSIOPEIA*, *ORION*.

CONSTIPATION, *kon sti pa'shum*, inactivity of the bowel movements. Constipation is one of the commonest ills of mankind, and is the source of numerous other ills. Its seriousness lies in the fact that it causes the accumulation of waste matter in the intestines, which means the retention in the system of countless hordes of poisonous germs. According to one authority this condition is responsible for premature old age. This theory still lacks positive proof, but that constipation is a direct menace to health is disputed by none. Lack of exercise, carelessness in heeding nature's call, and eating of concentrated foods are common causes of sluggish bowel movements. Change of one's habits is often sufficient to work a cure; hygienic remedies are far preferable to the use of medical laxatives, as the latter tend to aggravate the trouble and afford only temporary relief.

To avoid eating too much bulky food, one should include in the diet a good deal of fruit, vegetables, especially spinach and rhubarb, breads and cereals containing the husks of the grains, such as bran preparations, and cold water. Foods like the above are helpful because they leave a residue which makes bulk in the colon and acts as a stimulant to the bowels. Oils are also useful because they act as lubricants. Various nonabsorbable mineral oils are now on the market, and have proved valuable to many persons suffering from chronic constipation. For those who sit in offices all day, bending exercises and long walks each day are recommended.

CONSTITUTION, a body of rules by which the activities of a state are governed. It may be either a written instrument of a certain date, or an aggregation of laws and usages which have grown up in the history of the state. Constitutions are of two kinds, considered as to their place in the political system of different states as follows:

(1) Those which constitute the supreme fundamental law, combining and limiting the legislative and executive departments of government.

(2) Those which are only ordinary law, leaving the legislative department supreme in the government.

Of the former class the Constitution of the United States is the greatest example. Of the latter the constitution of Great Britain is typical. In the British system of government Parliament is supreme. Its decrees form a large part of the constitution of the Empire; but the constitution also contains or includes:

(1) Important treaties, such as the acts of union with Scotland (1707) and Ireland (1800)

(2) Decrees of the executive which have been approved or given silent consent until they form a part of the administrative system of the country

(3) Agreements, declarations and compacts made between the monarch and the people or Parliament, such as the Magna Charta (1215), the Declaration of Rights (1689), the Act of Settlement (1701).

(4) The great body of the common law; (5) many practical methods and means devised for carrying on government activities, but not having the direct legal sanction of any competent authority.

The Constitution of the United States differs in one important respect from the constitutions of the states of the union. The former formed a new government of enumerated or delegated powers, the source of authority being the states. The state constitutions are but instruments placing restrictions upon the powers of government already existing. See CONSTITUTION OF THE UNITED STATES; UNITED STATES, subhead *Government*; SUPREME COURT.

CONSTITUTION, THE, the most famous vessel in the history of the American navy. It was launched October 20, 1797, but was not equipped until the following year. In the war with the Barbary powers it was Commander Preble's flagship and took part in several bombardments of Tripoli. In July, 1812, under the command of Captain Isaac Hull, it engaged in a spirited race with a British squadron and escaped. On August 19 it fought a famous battle with the *Guerriere*, an English frigate under Captain Daeres, off Cape Race. It left the British vessel a total wreck after a contest of a half-hour. In 1828 the *Constitution* was condemned as unseaworthy and was ordered to be destroyed, but popular sentiment, aroused partly by Holmes's poem, *Old Ironsides*, compelled the abandonment of the project, and the *Constitution* was rebuilt in 1833. It was put out of commission in 1855, was again partially rebuilt

in 1877 and was stored at the Boston Navy Yard in 1897. It was restored to its original design in 1931 by children's contributions, then was exhibited in coast cities.

CONSTITUTIONAL UNION PARTY, a name assumed by a remnant of the Whig party in the South in the election of 1860. It nominated John Bell of Tennessee for President and Edward Everett of Massachusetts for Vice-President. Its platform announced no definite principles regarding the slavery controversy, but claimed to recognize "no political principle but the Constitution of the country, the union of the states and the enforcement of laws." It received no support in the North, but carried the border states of Kentucky, Tennessee and Virginia. See POLITICAL PARTIES IN THE UNITED STATES.



CONSTITUTION OF THE UNITED STATES, the supreme fundamental law of the United States of America, by which all powers of the national government are established and limited. The objects for which it was written and adopted are completely covered in the Preamble:

"We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America."

The states, after the Revolutionary War, had been loosely held together by the Articles of Confederation (see CONFEDERATION, ARTICLES OF). The Articles had not been in operation for a year before it was evident that they were in many respects defective as the fundamental law of the states. To remedy them a convention of delegates of all the states was frequently suggested. Such a demand was even made by various state legislatures between 1781 and 1786. In the latter year a resolution of the legislature of Virginia brought together a convention representing a number of states for the purpose of considering ways and means of advancing the commercial interests of the

nation. This meeting was called the Annapolis Convention (which see).

Five states sent delegates, and they reported unanimously that existing faults could not be remedied by any means at hand, as the trouble could be traced directly to the insufficient Articles of Confederation. It was recommended that a larger convention of all the states meet without delay to consider the Articles and amend them. This report attracted wide attention and when it reached the members of Congress it was approved. On February 21, 1787, Congress advised the states to send delegates to a national convention in Philadelphia, and May 14th was named as the date of meeting. The call was—

" * * * for the sole and express purpose of revising the Articles of Confederation and reporting to Congress and the several Legislatures such alterations and provisions therein as should, when agreed to in Congress and confirmed by the States, render the Federal Constitution adequate to the exigencies of Government and the preservation of the Union."

The number of delegates chosen to this convention was sixty-five; ten did not attend. The Convention remained in session until September 17, when its work was completed. It was found impossible to make satisfactory amendment or revision of the Articles of Confederation, and within the short space of four months a new Constitution was written. It was said by Gladstone that no other body of men in all the history of the world, regardless of the time employed, ever devised a system of government so admirable in its plan and so perfect in its operation as came from the hands of these fifty-five American patriots. That there was no unanimity of opinion in the Convention is apparent from the fact that sixteen members refused to sign the completed Constitution or left the convention before it was ready to be signed. The signatures of only thirty-nine of the members were appended to it.

In Article VII it was provided that the Constitution should become effective as soon as it was ratified by nine states. Eventually, all the thirteen states gave it legality, in the following order, by vote of their legislatures: Delaware, Dec. 7, 1787; unanimously. Pennsylvania, Dec. 12, 1787; vote, 46 to 23. New Jersey, Dec. 18, 1787; unanimously. Georgia, Jan. 2, 1788; unanimously. Connecticut, Jan. 9, 1788; vote, 128 to 40. Massachusetts, Feb. 6, 1788; vote, 187 to 168. Maryland, April 28, 1788; vote, 63 to 12.

South Carolina, May 23, 1788, vote, 149 to 73. New Hampshire, June 21, 1788, vote, 57 to 46. Virginia, June 25, 1788, vote, 88 to 79. New York, July 26, 1788, vote, 30 to 28. North Carolina, Nov. 21, 1788, vote, 193 to 75. Rhode Island, May 29, 1790, vote, 34 to 32.

The Constitution in Full. Following is the complete text of the Constitution, as adopted by the Convention and ratified by the states.

ARTICLE I LEGISLATIVE DEPARTMENT

Section 1. Congress in General.

All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives

Section 2. House of Representatives.

1 The House of Representatives shall be composed of members chosen every second year by the people of the several States, and the electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislature

2 No person shall be a Representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State in which he shall be chosen

3 Representatives and direct taxes shall be apportioned among the several states which may be included within this Union, according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of Representatives shall not exceed one for every thirty thousand, but each State shall have at least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to choose three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

4. When vacancies happen in the representation from any State, the executive authority thereof shall issue writs of election to fill such vacancies.

5. The House of Representatives shall choose their Speaker and other officers; and shall have the sole power of impeachment

Section 3. Senate.

1. The Senate of the United States shall be composed of two Senators from each State, chosen by the legislature thereof, for six

years, and each Senator shall have one vote

2 Immediately after they shall be assembled in consequence of the first election, they shall be divided as equally as may be into three classes. The seats of the Senators of the first class shall be vacated at the expiration of the second year, of the second class, at the expiration of the fourth year, and of the third class, at the expiration of the sixth year, so that one third may be chosen every second year; and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any State, the executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies

3 No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State for which he shall be chosen

4 The Vice-President of the United States shall be President of the Senate, but shall have no vote, unless they be equally divided

5 The Senate shall choose their other officers, and also a President pro tempore, in the absence of the Vice-President, or when he shall exercise the office of President of the United States

6 The Senate shall have the sole power to try all impeachments. When sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the Chief Justice shall preside, and no person shall be convicted without the concurrence of two-thirds of the members present.

7 Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust or profit under the United States, but the party convicted shall nevertheless be liable and subject to indictment, trial judgment and punishment, according to law

Section 4. Both Houses.

1 The times, places and manner of holding elections for Senators and Representatives, shall be prescribed in each State by the legislature thereof, but the Congress may at any time by law make or alter such regulations, except as to the places of choosing Senators

2 The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day

Section 5. The Houses Separately.

1 Each house shall be the judge of the elections, returns and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner, and under such penalties as each house may provide.

2 Each house may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two-thirds, expel a member.

3 Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy, and the yeas and nays of the members of either house on any question shall, at the desire of one-fifth of those present, be entered on the journal

4 Neither house, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting.

Section 6. Privileges and Disabilities of Members.

1 The Senators and Representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the Treasury of the United States. They shall in all cases, except treason, felony and breach of the peace, be privileged from arrest during their attendance at the session of their respective houses, and in going to and returning from the same, and for any speech or debate in either house, they shall not be questioned in any other place

2 No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased during such time, and no person holding any office under the United States, shall be a member of either house during his continuance in office

Section 7. Mode of Passing Laws.

1 All bills for raising revenue shall originate in the House of Representatives, but the Senate may propose or concur with amendments as on other bills

2 Every bill which shall have passed the House of Representatives and the Senate, shall, before it becomes a law, be presented to the President of the United States, if he approves he shall sign it, but if not he shall return it, with his objections to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered, and if approved by two-thirds of that house, it shall become a law. But in all such cases the votes of both houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall become a law, in like manner as if he had signed it, unless the Congress by their adjournment prevent its

return, in which case it shall not be a law.

3 Every order, resolution, or vote to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the same shall take effect, shall be approved by him, or being disapproved by him, shall be re-passed by two thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Section 8. Powers granted to Congress.

The Congress shall have power:

1. To lay and collect taxes, duties, imposts and excises to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts and excises shall be uniform throughout the United States,
2. To borrow money on the credit of the United States,
3. To regulate commerce with foreign nations, and among the several States, and with the Indian tribes,
4. To establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States,
5. To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures,
6. To provide for the punishment of counterfeiting the securities and current coin of the United States,
7. To establish post offices and post roads;
8. To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries;
9. To constitute tribunals inferior to the Supreme Court;
10. To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations,
11. To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water,
12. To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years;
13. To provide and maintain a navy;
14. To make rules for the government and regulation of the land and naval forces;
15. To provide for calling forth the militia to execute the laws of the Union, suppress insurrection and repel invasions;
16. To provide for organizing, arming, and disciplining, the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively, the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress;
17. To exercise exclusive legislation in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular States, and the acceptance of Congress, become the seat of the Government

of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings, and

18 To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the Government of the United States, or in any department or officer thereof

Section 9. Powers denied to the United States.

- 1 The migration or importation of such persons as any of the States now existing shall think proper to admit, shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight, but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.
 - 2 The privilege of the writ of habeas corpus shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.
 3. No bill of attainder or ex post facto law shall be passed
 - 4 No capitation, or other direct, tax shall be laid, unless in proportion to the census or enumeration herein before directed to be taken.
 5. No tax or duty shall be laid on articles exported from any State.
 - 6 No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another, nor shall vessels bound to, or from, one State, be obliged to enter, clear, or pay duties in another.
 7. No money shall be drawn from the Treasury, but in consequence of appropriations made by law, and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.
 8. No title of nobility shall be granted by the United States, and no person holding any office of profit or trust under them, shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign State.
- #### Section 10. Powers denied to the States.
1. No State shall enter into any treaty, alliance, or confederation, grant letters of marque and reprisal; coin money, emit bills of credit; make anything but gold and silver coin a tender in payment of debts, pass any bill of attainder, ex post facto law, or law impairing the obligation of contracts, or grant any title of nobility
 2. No State shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws, and the net produce of all duties and imposts, laid by any State on imports or exports, shall be for the use of the Treasury

of the United States, and all such laws shall be subject to the revision and control of the Congress

3 No State shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another State, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II. EXECUTIVE DEPARTMENT

Section 1. President and Vice-President.

1 The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice-President, chosen for the same term, be elected as follows:

2 Each State shall appoint, in such manner as the legislature thereof may direct, a number of electors equal to the whole number of Senators and Representatives to which the State may be entitled in the Congress, but no Senator or Representative or person holding an office of trust or profit under the United States shall be appointed an elector.

3 (The electors shall meet in their respective States and vote by ballot for two persons, of whom one at least shall not be an inhabitant of the same State with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each, which list they shall sign and certify, and transmit sealed to the seat of government of the United States, directed to the President of the Senate. The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted. The person having the greatest number of votes shall be the President, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose by ballot one of them for President; and if no person have a majority, then from the five highest on the list the said House shall in like manner choose the President. But in choosing the President, the votes shall be taken by States, the representation from each State having one vote, a quorum for this purpose shall consist of a member or members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. In every case, after the choice of the President, the person having the greatest number of votes of the electors shall be the Vice-President. But if there should remain two or more who have equal votes, the Senate shall choose from them by ballot the Vice-President. [Superseded by Amendment XII.]

4 The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

5 No person except a natural born citizen, or a citizen of the United States, at the time

of the adoption of this Constitution, shall be eligible to the office of President, neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years a resident within the United States.

6 In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice-President, and the Congress may by law provide for the case of removal, death, resignation or inability, both of the President and Vice-President, declaring what officer shall then act as President, and such officer shall act accordingly until the disability be removed, or a President shall be elected.

7 The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive within that period any other emolument from the United States, or any of them.

8 Before he enter on the execution of his office, he shall take the following oath or affirmation:

"I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will to the best of my ability preserve, protect and defend the Constitution of the United States."

Section 2. Powers of the President.

1 The President shall be Commander in Chief of the army and navy of the United States, and of the militia of the several States, when called into the actual service of the United States, he may require the opinion, in writing, of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

2 He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur, and he shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law, but the Congress may by law vest the appointment of such inferior officers, as they think proper, in the President alone, in the courts of law, or in the heads of departments.

3 The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Section 3. Duties of the President.

He shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and

expedient; he may, on extraordinary occasions, convene both houses, or either of them, and in case of disagreement between them, with respect to the time of adjournment, he may adjourn them to such time as he shall think proper, he shall receive ambassadors and other public ministers, he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States

Section 4. Impeachment.

The President, Vice-President, and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors

ARTICLE III JUDICIAL DEPARTMENT.

Section 1. United States Courts.

The judicial power of the United States, shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services, a compensation, which shall not be diminished during their continuance in office.

Section 2. Jurisdiction of the United States Courts.

1. The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority, to all cases affecting ambassadors, other public ministers and consuls, to all cases of admiralty and maritime jurisdiction, to controversies to which the United States shall be a party, to controversies between two or more States, between a State and citizens of another State, between citizens of different States, between citizens of the same State claiming lands under grants of different States, and between a State, or the citizens thereof, and foreign States, citizens or subjects

2. In all cases affecting ambassadors, other public ministers and consuls, and those in which a State shall be a party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions, and under such regulations as the Congress shall make

3. The trial of all crimes, except in cases of impeachment, shall be by jury, and such trial shall be held in the State where the said crime shall have been committed, but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed

Section 3. Treason.

1. Treason against the United States, shall consist only in levying war against them, or in adhering to their enemies, giving them aid

and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court

2. The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood, or forfeiture except during the life of the person attainted

ARTICLE IV THE STATES AND THE FEDERAL GOVERNMENT

Section 1. State Records.

Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. And the Congress may by general laws prescribe the manner in which such acts, records and proceedings shall be proved, and the effect thereof

Section 2. Privileges of Citizens, Etc.

1. The citizen of each State shall be entitled to all privileges and immunities of citizens in the several States

2. A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime

3. No person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Section 3. New States and Territories.

1. New States may be admitted by the Congress into this Union, but no new State shall be formed or erected within the jurisdiction of any other State, nor any State be formed by the junction of two or more States, or parts of States, without the consent of the legislatures of the States concerned as well as of the Congress.

2. The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States, and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or of any particular State

Section 4. Guarantee to the States.

The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion, and on application of the legislature, or of the executive (when the legislature cannot be convened) against domestic violence

ARTICLE V. POWER OF AMENDMENT.

The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this Constitution, or, on the

ARTICLE VII.

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise reexamined in any court of the United States, than according to the rules of the common law.

ARTICLE VIII

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted

ARTICLE IX.

The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

ARTICLE X.

The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

ARTICLE XI.

The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign State.

ARTICLE XII.

1. The electors shall meet in their respective States, and vote by ballot for President and Vice-President, one of whom, at least, shall not be an inhabitant of the same State with themselves, they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate; the President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted, the person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President the votes shall be taken by States, the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of

March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President

2. The person having the greatest number of votes as Vice-President, shall be the Vice-President, if such number be a majority of the whole number of electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice-President, a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice

3 But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States

ARTICLE XIII

1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction

2 Congress shall have authority to enforce this article by appropriate legislation

ARTICLE XIV

1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States, nor shall any State deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws

2 Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, Representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

3 No person shall be a Senator or Representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against

the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

4 The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave, but all such debts, obligations, and claims shall be held illegal and void.

5 The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV

1 The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude.

2 The Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XVI

The Congress shall have power to lay and collect taxes on incomes from whatever source derived without apportionment among the several states, and without regard to any census or enumeration.

ARTICLE XVII

1 The Senate of the United States shall be composed of two Senators from each state, elected by the people thereof, for six years, and each Senator shall have one vote. The electors in each state shall have the qualifications requisite for electors of the most numerous branches of the state legislatures.

2 When vacancies happen in the representation of any state in the Senate, the executive authority of such state shall issue writs of election to fill such vacancies. Provided, That the legislature of any state may empower the executive thereof to make temporary appointment until the people fill the vacancies by election as the legislature may direct.

3 This amendment shall not be so construed as to affect the election or term of any Senator chosen before it becomes valid as part of the Constitution.

ARTICLE XVIII

1 After one year from the ratification of this article the manufacture, sale or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited.

2 The Congress and the several states shall have concurrent power to enforce this article by appropriate legislation.

3 This article shall be inoperative unless it shall have been ratified as an amendment to the constitution by the legislatures of the

several states, as provided in the constitution, within seven years from the date of the submission thereof to the states by the Congress.

ARTICLE XIX

The right of citizens of the United States to vote shall not be abridged by the United States or by any state on account of sex.

Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XX

1 The terms of the President and Vice President shall end at noon on the 20th day of January, and the terms of Senators and Representatives at noon on the 3rd day of January, of the years in which such terms would have ended if this article had not been ratified, and the terms of their successors shall then begin.

2 The Congress shall assemble at least once in every year, and such meeting shall begin at noon on the 3rd day of January unless they shall by law appoint a different day.

3 If, at the time fixed for the beginning of the term of the President, the President-elect shall have died, the Vice President-elect shall become President. If a President shall not have been chosen before the time fixed for the beginning of his term or if the President-elect shall have failed to qualify, then the Vice President-elect shall act as President until a President shall have qualified, and the Congress may by law provide for the case wherein neither a President-elect nor a Vice President-elect shall have qualified, declaring who shall then act as President, or the manner in which one who is to act shall be selected, and such person shall act accordingly until a President or Vice President shall have qualified.

4 The Congress may by law provide for the case of the death of any of the persons from whom the House of Representatives may choose a President whenever the right of choice shall have devolved upon them, and for the case of the death of any of the persons from whom the Senate may choose a Vice President whenever the right of choice shall have devolved upon them.

5 Sections 1 and 2 shall take effect on the 15th day of October following the ratification of this article.

6 This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the Legislatures of three-fourths of the several States within seven years from the date of its submission.

ARTICLE XXI

1 The 18th article of amendment to the Constitution of the United States is hereby repealed.

2 The transportation or importation into any State, Territory, or possession of the United States for delivery or use therein of intoxicating liquors, in violation of the laws thereof, is hereby prohibited.

3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by conventions in the several States, as provided in the Constitution, within seven years from the date of the submission thereof, to the States by the Congress.

CONSUL, *kon'sul*, an official appointed by the government of one country to attend to its commercial interests in a city of another country. The duties of a consul are to promote trade; to give advice and assistance, when called upon, to his fellow citizens temporarily there; to uphold their lawful interests and privileges; to transmit reports of trade, industry and navigation to his government; to authenticate certain documents.

Roman Consuls. These were the two highest magistrates in the Republic of Rome. They were annually elected, at first only from the patricians, at a later period also from the plebeians. The consul was required to be at least forty-five years of age and must have passed through certain inferior offices. At first, the consuls could declare war, conclude peace, make alliances and even order a citizen to be put to death. Their powers were gradually curtailed, and under the emperors the consular dignity rapidly declined and became merely honorary.

CONSUMPTION. See **TUBERCULOSIS**.

CONSUMPTION, in political economy, is the use of products to satisfy human needs. The use of machinery to manufacture clothing and the wearing of the clothing by the purchasers are both forms of consumption, and each illustrates a different kind of consumption. The employment of machinery to make clothing is an example of *productive* consumption, for the result is production; the wearing out of the clothing, on the other hand, is *final* consumption. The eating of food is another example of final consumption, and it differs from the destruction of food in that a human need is satisfied. Consumption and destruction are therefore not equivalent. The same comparison may be drawn between the burning of wood for fuel and the destruction of trees in a forest fire. Economists also distinguish between useful and harmful consumption. The careless use of a scarce product in wartime is an example of the latter.

CONTAGIOUS, *kon ta'jus*, **DISEASES** are diseases which one may acquire by touching people afflicted with them, or objects contaminated by the patients, or secretions of the patients. Nearly all contagious diseases are

germ disorders, or infections. There are some infections, however, which are not acquired by direct contact, and it is thus correct to say that an infectious disease may or may not be contagious. Smallpox, diphtheria, measles, scarlet fever, chicken pox, whooping cough and mumps are typical contagious diseases. The control of epidemics of these diseases has made great progress in recent years as sanitary science has advanced. See **SANITARY SCIENCE**.

CONTEMPT', an offense against the dignity, order or authority of a court or legislative assembly, usually consisting in failure to obey its specific commands, or in insults. Penalties vary from small fines to brief jail sentences.

CONTINENTAL SYSTEM, a plan devised by Napoleon during the Napoleonic wars with England to exclude Great Britain from all intercourse with the continent of Europe. It began with the Berlin Decree of November 21, 1806, by which the British Islands were declared to be in a state of blockade; all commerce, intercourse and correspondence were prohibited; every Englishman found in France, or in a country occupied by French troops, was declared a prisoner of war, all property belonging to the English was declared fair prize, and all trade in goods from Britain or British colonies was entirely prohibited.

Great Britain replied by Orders in Council, prohibiting trade with French ports and declaring all harbors of France and its allies subjected to the same restrictions as if they were closely blockaded. Further decrees on the part of France, of a still more stringent kind, denationalized all vessels of whatever flag, which had been searched by a British vessel or which had paid duty to Britain, and directed the burning of all captured British goods. These decrees caused extreme indignation and great annoyance, and gave rise to much smuggling, till the fall of Napoleon in 1814. The insistence of England on her Orders in Council was one cause of the War of 1812 with the United States (see **WAR OF 1812**).

CONTRABAND OF WAR. Contraband means *prohibited traffic*, or *that which is forbidden*. Contraband of war includes goods which a nation at war knows will be useful to its enemy. Such goods, found on the high seas, are subject to seizure by the enemy. They always include munitions of

war, such as arms and explosives, also uniforms, food destined for soldiers, and any machinery intended in any degree to aid in prosecuting the war. All such goods, directly used in war, are called *absolute contraband*. Another class of merchandise, intended for non-combatants, such as all kinds of food-stuffs, clothing, etc., may be declared *occasional contraband*, by proclamation of any belligerent (see BELLIGERENT).

A nation at war always issues a proclamation stating what goods it declares to be contraband. Neutral vessels carry contraband goods and deal with either or both belligerents at their own risk. Captured goods may be paid for by the captor nation or they may be sold to its citizens; but not always are the owners reimbursed with the proceeds. See WORLD WAR.

CONTRACT, in law, an agreement between two or more persons in which each party binds himself to do or forbear some act, and each acquires a right to what the other promises. Contracts may be in expressed terms or may be implied from the acts of the parties; they may be verbal or written, and at common law both forms are binding, but usually under statute law the promise must be in writing. The law of contract occupies by far the larger place in the commercial law of all nations, and there is general harmony in the principles by which it is governed.

Certain classes of persons are under peculiar disabilities as to the making of contracts:

(1) In common law, contracts made by an infant (a person under twenty-one years) are voidable unless they are in some way for his special benefit or, in particular, for the necessities of life.

(2) A married woman, in jurisdictions where the law merges her in her husband, cannot bind herself by contract.

(3) Contracts made by a lunatic are void. The same principle is extended to drunkards.

(4) A corporation can make binding contracts only for things or acts connected with the business for which it was especially created and chartered, excepting in cases of "convenience almost amounting to necessity" (see CORPORATION).

(5) Contracts between citizens of two countries at war are illegal and void.

The making of a contract comprises two acts: first, an offer; second, an acceptance. The offer may be either in oral or written words, or by action which a reasonable person would interpret as meaning a certain

definite thing. The acceptance may be either by word or by action. It must be given directly to the offeror or addressed to him and delivered to the usual carriers of communication, such as the mail or telegraph. It constitutes an assent, and the bargain is closed, if it is delivered to the carrier within a time during which it is previously agreed the offer remains open.

Every contract must be founded on a *consideration*, either of money or of some act whereby an advantage accrues to one or both parties. Thus, the promise of a gift for no compensation whatever cannot be enforced at law. However, the law considers such a consideration as love and affection between near relatives a good consideration in certain cases. Certain considerations are held to be insufficient or illegal; among others, the promise to do an unlawful or impossible act is not binding. A contract obtained by fraud, mistake or compulsion cannot be enforced.

Contracts upon certain subjects, or between certain classes of parties, must be *sealed*, that is, signed and sealed by the contracting parties (see SEAL). Certain others, known as *parole contracts*, must be reduced to writing in order to be enforced. Among these are the sale of real estate, contracts to be performed more than one year in the future, the guarantee to pay another man's debt, agreements to confer property on marriage and, in some states, the sale of goods valued at more than a certain amount.

Contracts are void when their subject matter is illegal. Such are contracts forbidden by statute (for instance, betting and gambling); those forbidden by common law (for instance, contracts to commit crime); contracts contrary to public policy (for instance, in restraint of trade; in restraint of marriage; those which pervert the acts of government, such as bribery; those which obstruct the course of justice, and those which are immoral). Certain other contracts are voidable, that is, can be set aside, though not necessarily illegal (for instance, those obtained by mistake, fraud, misrepresentation or compulsion).

CONTRACT LABOR LAW, a statute of the United States relating to the importation of persons from foreign countries who come to the American nation under contract to perform certain labor. The first law of the kind was passed in 1885, and prohibited

the importation only of unskilled contract labor. A new law enacted in 1903 included both skilled and unskilled contract labor. Since then restrictions have been modified in favor of aliens who wish to enter the United States temporarily in pursuit of one of the arts or a profession. The law assumes that other persons might reach America under contract to perform a certain piece of work and while here would deprive American citizens of deserved opportunity in like fields, and thus add to unemployment problems.

CONVICT LABOR, the system in force in penitentiaries, of employing prisoners in productive enterprises, in order to keep them from idleness and to make them earn their keeping. Several general plans are in operation in the United States. In the *lease system* the convicts are leased to contractors, who thereupon assume entire responsibility for their care and safe-keeping. The *contract system* is used in two different forms: In one the state furnishes the material and tools, the work being supervised by the contractor; in the other, the *piece-price system*, the contractor furnishes the tools and material, the work is supervised by state officials and the finished product is bought at a fixed price by the contractor. The chief advantages of this plan are that the state avoids risk of loss in selling the products, is not compelled to make investment and furnishes steady employment to its prisoners. The objections, however, are many. It often interferes with prison discipline, it gives the contractor an unfair advantage over his competitors, and it probably tends to reduce wages in the lines in which it is used.

The *public account system* is gaining ground. All materials and equipment are provided by the state; the work is also supervised by the state officials, and the state either uses or sells the product. The *state-use system* is similar to the above, but the products are used exclusively by the state. Finally, there is the *public works and ways system*, whereby convict labor is used in public construction, as road making. The public-account, state-use and public-works systems are in most general use in America.

CONVOLVULUS, *kon vol'vu lus*, a genus of slender, twining herbs with milky juice, bearing bell-shaped flowers. Some species are common weeds; others are cultivated in gardens for their beauty, and still others have strong medicinal properties. This genus

gives the name to a large family of plants, many of which are of great interest.

Related Articles. Among the members of this group are the following.

Bindweed	Morning-Glory
Dodder	Scammony
Jalap	Sweet Potato

CONVULSION, *kon vul'shun*, a contortion of the muscles, also called *spasm*. Convulsions manifest themselves in many forms, they are not a disease, but are a symptom of disease. Violent twitchings of the muscles and frothing at the mouth are characteristic features of epilepsy (which see), and facial jerklings accompany Saint Vitus's dance. Then there are the familiar spasms of infants, which often result from indigestion. Many cases of pneumonia, measles and scarlet fever in babies start with spasms. Dr. L. E. Holt advised the following treatment for infantile attacks of convulsions:

Keep the child perfectly quiet with ice at the head, put the feet in a mustard bath, and roll the entire body in large towels which have been dipped in mustard water, and have plenty of hot water and a bathtub at hand, so that the doctor can give a hot bath if he thinks it advisable.

If the convulsions continue until the pulse is weak, the face very pale, the nails and lips blue, and the feet and hands cold, the hot bath will bring blood to the surface and relieve the heart, lungs and brain.

The temperature should not be over 106° F; this should be tested by a thermometer if one can be obtained. Without this precaution, in the excitement of the moment, infants have frequently been put into baths so hot that serious and even fatal burns have been produced. If no thermometer is available the nurse may plunge her arm to the elbow into the water. It should feel warm, but not uncomfortable. One-half a teaspoonful of powdered mustard added to the bath often adds to its efficacy.

CONWAY CABAL, *ka bai'*, a conspiracy organized among a group of officers in the American colonial army in 1777, whose chief object was the promotion of its members, especially of General Horatio Gates to supreme command of the Continental Army. The conspiracy took its name from its most active member, Thomas Conway, and included many prominent men, among them General Charles Lee. Other more sturdy patriots, as John and Samuel Adams, though not intimately associated with the cabal, were not averse to its purposes. It accomplished much evil during its short life, but it was finally crushed, when its dishonest methods and its unpatriotic purposes were exposed.

COOLIDGE, CALVIN (1872-1933), lawyer, statesman, thirtieth President of the United States. He was born at Plymouth, Vt., on July 4, 1872, with ancestry that goes back to the origins of New England. There he imbibed those notions of liberty under law, those habits of industry and serious thought, that developed into the man of character, of purpose,—the public administrator. He attended the village school, later Black River Academy at Ludlow, and St. Johnsbury Academy, and at 17 entered Amherst College, from which he was graduated *cum laude* in 1895. He showed in this period a great interest in political history. In his senior year at Amherst he won a competition open to students of all colleges for an essay on "The Principles for Which the Revolution Was Fought."

The same year he went to Northampton, Mass., where he studied law, and earned the right to practice in 1897. In 1905 he married Miss Grace A. Goodhue, of Burlington, Vt., and they established their home in Northampton. While the practice of law brought him some success, his real interest was in the political field. At a later time he said in a public address: "Politics is not an end, but a means. It is not a product, but a process. It is the art of government. Like other values, it has its counterfeits. . . . It is the process of action in public affairs."

His Rise to the Presidency. Coolidge's rise to the higher places in State and National politics was a gradual process, step by step. In 1899 he was elected to the city council, and he filled in succession the offices of city attorney, and clerk of court. He was state representative, then mayor of the city, and in 1912 was elected to the Massachusetts Senate. Here he served for four years, the last two as its President. Then for two years he was Lieutenant-Governor, and for the next two years (1919-1920), Governor of Massachusetts. The Republican National Convention nominated him for the vice-presidency in 1920, and he was elected to that office, succeeding to the Presidency, in August 1923, on the death of President Harding, and was elected in 1924 to continue in that high office.

His Career in Massachusetts. In the several positions which he held in his home state, Coolidge mastered the problems of each as he went along, and there is evidence that the problems of the nation received much

of his attention and study. In the State Senate his work attracted wide attention; his was recognized as one of the best informed minds on public questions of the day. As Governor he had to face some difficult situations. The one which focussed the eyes of the Nation on Massachusetts was the strike of the Boston police in September, 1919. The Boston police are a part of the state organization and act under its authority, hence the situation was one for the State officials to handle. Governor Coolidge's condemnation of the strike was heralded to all parts of the country and made him a national figure. One sentence in his message to a union leader was "There is no right to strike against the public safety by anybody, anywhere, anytime." Other situations calling for executive action brought statements or vetoes which displayed both Coolidge's independent courage, and the fundamental soundness of his political philosophy.

The 1920 Convention. The Republican National Convention, in June, 1920, had several candidates for the nomination for the presidency who were outstanding figures in the nation, men of highest character and attainments, who had performed important services, and deserved high consideration on their records. Warren G. Harding won the nomination for the presidency on the tenth ballot, and Calvin Coolidge was unanimously nominated for the vice-presidency. There is no doubt that Coolidge's nomination was due to the conviction of his real presidential qualities. The Harding and Coolidge ticket won by a large majority in the November election. Under our system of government the Vice-President has no administrative responsibilities. But President Harding instituted the practice of requesting the Vice-President to attend the Cabinet meetings. This proved a most fortunate plan, for it enabled Coolidge to get a clear understanding of the public questions under discussion, and the attitude of the administration on them.

Accession to the Presidency. The death of President Harding, August 2, 1923, came with dramatic suddenness, and mingled with the grief of the nation was a national anxiety as to the capacity of Calvin Coolidge to measure up to the responsibilities of the presidency. In the quiet of his boyhood home, and in the presence of his father, a notary public, he took the oath of office. The habitual reticence which marked Coolidge's inter-

course with other men, his habit of keeping his own counsel, served to focus the attention and interest of the country on his infrequent public addresses. President Harding's Cabinet was retained without change, and the announcement was made that the policies of the Harding Administration would be continued. Confidence in the President grew steadily, as he declared himself on public questions as they arose.

His First Message to Congress. In his first message to Congress, Coolidge gave the keynote to his administration. He not only gave to Congress and the country the fundamentals of his political philosophy, but made definite recommendations with courage and sound argument. He followed President Harding in advocacy of American membership in the world court. The proposed soldiers' bonus he did not favor, but he strongly urged on Congress the duty of giving adequate care to the veteran soldiers, to give hospital relief and compensation to those who had suffered disabilities, and to their dependents, and to provide rehabilitation and vocational training.

He recommended Secretary Mellon's plan for tax reduction aided by budget retrenchment, cut in charges on earned incomes and surtaxes, and abolition of nuisance taxes. He urged a constitutional amendment to abolish tax exempt securities. He opposed the cancellation of foreign debts, but advocated generosity in terms of settlement. The recognition of the Russian government was opposed, but aid to the Russian people was urged. He favored railroad legislation, for purpose of insuring fair rates and just returns. The proposed plan to aid farmers by fixing export price of wheat was opposed; he asserted that permanent help must come from their own initiative and cooperation. He insisted on dry law enforcement, advocated inland waterways, asked for a strong army and navy, favored restricted immigration with selection at the source.

Legislation—68th Congress. A new tax law was passed in 1924, but it differed considerably from the Mellon plan; it did however give much relief to the taxpayers. A soldiers' bonus bill was passed, but vetoed on the ground that it would add too greatly to the tax burden; Congress passed the bill over his veto. A bill to increase the pay of postal employees, whose salaries were admitted to be too low, was vetoed, because Con-

gress made no provision to provide the necessary funds.

Inherited Embarrassments. Disclosures connected with the leasing of the Teapot Dome oil fields during Harding's administration did not involve President Coolidge personally, but members of the Cabinet who had remained with him were involved. The Department of Justice was attacked; Attorney-General Daugherty was forced from the Cabinet, Secretary of the Navy Denby resigned, and ex-Secretary of the Interior Fall, held to be the most responsible for the scandal, had left office before the death of Harding.

The administration, through the Department of Justice, brought suit against the lessees of the Teapot Dome and other oil fields, and after a lengthy trial before the Supreme Court the leases were cancelled and the oil reserve lands in Wyoming and California were returned to the Government. The decision of the Supreme Court was handed down on October 10, 1927, and was based on the conclusion that the transaction had been made "by means of a collusion and conspiracy." Subsequently the principal actors in the leasing transaction were brought to trial on the charge of conspiracy to defraud the Government.

Election of 1924. The Republican National Convention met in Cleveland in June, and nominated Coolidge by an almost unanimous vote, completing the ticket by naming General Charles G. Dawes for Vice-President. The Democratic Party's candidate was John W. Davis, and Robert M. LaFollette received the nomination of the Conference for Progressive Political Action.

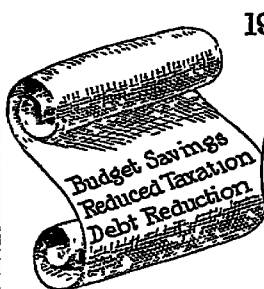
About 30,000,000 votes were cast at the election in November, and Coolidge was elected President by the greatest popular majority on record. In the Electoral College he received 382 votes, Davis, the Democratic nominee, 136 votes, and LaFollette, 13, these coming from his home state, Wisconsin.

Legislation—69th Congress. Many of the measures recommended by President Coolidge were enacted by this Congress and became law. A new revenue bill provided for further tax reduction; authority was given for arranging debt settlements with European nations; the Senate approved American participation in the World Court; a farm relief bill failed to pass the Senate; prohibition enforcement was actively debated, but no action was taken to revise the law; a bureau

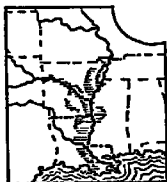
COOLIDGE'S ADMINISTRATION

1923

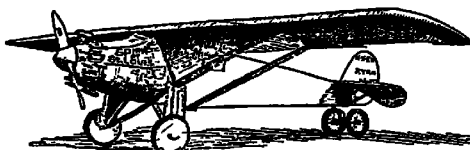
1929



Calvin Coolidge

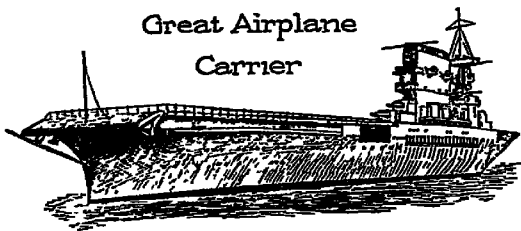


Flood Control
Legislation



Spirit of St. Louis
Progress in Aviation

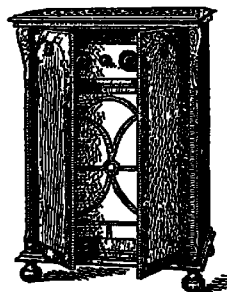
Great Airplane
Carrier



McNary-Haugan
Farm Relief Bill
Vetoed



Coolidge Homestead, Plymouth, Vermont



Radios in
Millions of Homes

of commercial aviation was established in the Department of Commerce, and other measures were passed to encourage aviation.

Larger salaries to justices of the Federal Courts were granted; a radio regulation act was passed; the McNary-Haugen farm relief bill was passed, but vetoed by President Coolidge; the federal budget, calling for the expenditure of over \$4,000,000,000, was passed.

Legislation—70th Congress. In his message to the Seventieth Congress President Coolidge again urged constructive economy as necessary to a continuance of credit; tax revision to remove inequalities; funds for national defense; and a study of the flood control problem in the Mississippi Valley.

Congress passed the Mississippi flood-control bill; a merchant marine bill; a tax-reduction bill; and the McNary-Haugen farm relief bill. The last named was again vetoed by President Coolidge, and Congress failed to pass it over the veto.

Many investigations were undertaken by Senate Committees. Among these were expenditures in the 1926 primaries in Pennsylvania and Illinois; presidential primary expenditures; public utilities' financing; extent of unemployment; condition of American Indians, and chain-store merchandising.

Progress in Science. A new era in communication was inaugurated early in 1927 by the demonstration of a new electrical apparatus for transmitting both voice and picture simultaneously. Television is the name given to this method, which was later shown to the public by theatrical producers.

Earlier in the year, for the first time, a successful telephone conversation was maintained between officials in New York and London. This result was effected by a combination of wired land lines and trans-oceanic radio.

The marvel of this decade is the radio. Millions of receiving sets in American homes are bringing entertainment and instruction in kind and quality never before known. The President's addresses are broadcast to millions of listeners, who would not otherwise know the sound of his voice.

Notable Events. All previous peace-time achievements in aviation were overshadowed by the records made by daring aviators in the years 1926, 1927 and 1928. Americans were responsible for much of the progress made in the art and science of aviation.

On May 9, 1926, Commander Richard E. Byrd and Floyd Bennett flew from Spitzbergen to the North Pole and return in a trimotored Fokker plane. Aviators of other countries made long and successful flights. Congress passed a bill establishing a Bureau of Commercial Aviation. An air-mail service organized by the Post Office Department grew to large proportions and reached out to all parts of the country.

Among all the attempts to cross the Atlantic by air, many of them successful, the exploit of Charles Lindbergh stands as the classic example of perfect flying. Taking off from Roosevelt Field, Long Island, on the morning of May 20, 1927, he went direct to Paris in a non-stop flight of less than 34 hours, in a single-motored monoplane. Interest in aviation developed rapidly and extended to all parts of the world. (See LINDBERGH, CHARLES A.)

The sixth International Conference of American States was held in Havana, Cuba, during January and February, 1928. Added public interest was given to this Conference, because of its invitation to President Coolidge to attend. He delivered the formal opening address, in which he dwelt strongly on the freedom of the American republics from the jealousies and hatreds of the Old World, and on the great advances in the application of the principles of human rights, political freedom and equality, and economic opportunity.

In August, 1927, President Coolidge startled the country by stating, "I do not choose to run for President in 1928." And in June, 1928, the National Republican Party, in convention at Kansas City, nominated Herbert Hoover, Secretary of Commerce in President Coolidge's Cabinet, to succeed him.

Foreign Relations. Friendly relations were maintained with all nations. Mexican laws claiming ownership of oil lands, on which Americans had made large investments, for a time caused some irritation, but friendly diplomacy brought the controversy to a satisfactory end. Political revolution in Nicaragua led to the landing of U. S. forces to protect American interests, and President Diaz of Nicaragua requested the United States Government to assist in suppressing the local rebellion and in supervising an election of president in October, 1928. United States forces sent to Nicaragua to carry out these purposes were successful in suppressing the rebellion and restoring peace.

CONWAY, THOMAS (1733-1800), leader of the Conway Cabal (which see), was an Irishman by birth. He gained military experience in the French Army, and in 1777 offered his services to the American Congress. He was given the rank of brigadier general, and was active in the battles of Brandywine and Germantown. After the discovery of the intrigue, he resigned from the army (1778), and was wounded in a duel with an American officer, who resented his attacks on Washington. In 1779, he returned to France.

COOK, FREDERICK A. See **NORTH POLAR EXPLORATION.**

COOK, JAMES (1728-1779), one of the most celebrated of English navigators. He entered the British navy at the age of twenty-seven, and in 1759, as sailing master of the *Mercury*, made a valuable survey of the Saint Lawrence River and the Newfoundland coast. This service led to his appointment to the command of a scientific expedition in the Pacific, and promotion to the rank of lieutenant. In the course of this expedition he visited New Zealand, discovered New South Wales and returned home in 1771 by way of the Cape of Good Hope. In 1772 Captain Cook, then risen to rank of commander in the navy, had charge of another successful voyage of exploration and discovery in the Pacific. In the course of an expedition begun soon after this he attempted to find a north-west passage. On this voyage he also explored the Western coast of North America and rediscovered the Sandwich (now Hawaiian) Islands, on one of which he was killed by natives.

COOKERY, the art of preparing food for the table by the use of heat. Cookery makes food more palatable and aids in its digestion. For the purpose of cooking, foods are classified into meats and vegetables, the meats including fish. Cooking meats coagulates the albumen which they contain, breaks up the muscular fiber, so that it is more easily separated and digested, and liberates juices and gases that contribute to its flavor. The general principle to be observed in cooking meats is to coagulate the albumen on the outside, so that it will not allow the juices to escape. This preserves the most nourishing part of the meat within the cut and makes the cooked part more palatable. Meats are cooked by boiling, roasting, baking, broiling, braising and

frying. Unless it is desired for soup, the meat should be placed in a hot oven or over a hot fire, or in case of boiling, into very hot water, in order that the albumen on the outside may be coagulated.

The object of cooking vegetables is to break up the starch which they contain and to soften and loosen the fiber. When cooked, starch becomes much more digestible than in the raw state. Vegetables are cooked by boiling, baking or steaming. Most vegetables are best cooked by immersing them in boiling water for a short time and then completing the process at a lower temperature. Dough which contains a raising mixture, such as yeast or baking powder, is either baked or steamed, according to the article (see **BREAD**). Vegetables should not be over-cooked, as over-cooking destroys much of their nutritive value and renders them indigestible.

Further discussion of this subject may be found in the article **Domestic Science**.

COOLEY, THOMAS MCINTYRE (1824-1898), an American jurist and author and one of the world's authorities on international law, was born at Attica, N. Y. He removed to Michigan and was admitted to the bar of that state in 1846. In 1859 he became professor, and subsequently dean of the faculty, of the law department of the University of Michigan. In 1864 he was appointed to the state supreme bench, and in 1867 he became chief justice. In 1887 he was placed at the head of the interstate commerce commission, but resigned in 1891. His books include treatises on the constitutional limitations upon state legislatures, constitutional law and torts.

COOPER, JAMES FENIMORE (1789-1851), the first American novelist who became well known in Europe, sometimes called the "American Scott." He was born in Burlington, N. J., and studied at Yale, but he was not a close student and was expelled from college in his third year. Other things besides books he knew well, and his intimate acquaintance with the forests and his knowledge of the sea, gained while serving in the United States navy, furnished him later with the materials for his novels. After his retirement from the navy just before the War of 1812, he settled at Cooperstown, N. Y., and took to farming.

Having boasted to his wife that he could write a better novel than many of the roman-

the ones which were appearing in his time, he produced *Precaution*, a tale which was commonplace, because it dealt with phases of English high life with which Cooper was totally unacquainted. It did, however, start him on a literary career, and when in 1821 he turned to tales of adventure in his own country and wrote *The Spy*, he was recognized at once as a novelist of force. In the twenty years that followed Cooper brought out many novels, chief among them *The Pilot* and *The Red Rover*, sea tales, and the *Leatherstocking Tales*, his great series dealing with frontier life in America. This series includes *Deerslayer*, *The Last of the Mohicans*, *The Pathfinder*, *The Pioneer* and *The Prairie*, of which *The Last of the Mohicans* is the best.



JAMES FENIMORE COOPER

After spending seven years in Europe, Cooper returned to the United States and settled in his own home. The superior culture of Europe had made him look with displeasure on the ruggedness of his own country, and he attempted, by articles published in various papers, to explain to his fellow countrymen what he thought they ought to be. The result was, of course, bitter censure, and Cooper, unable to accept criticism, brought numerous lawsuits against those who attacked him. This course brought down upon him much ridicule at home and abroad.

Cooper's writings were immensely popular in their own day and are still very widely read. They were the first novels of forest and prairie life, and while they have many faults, his vivid description and stirring narrative account readily for the enthusiasm with which they were received. It has been objected that his Indians are idealized, and that his characters are not real, but Cooper probably knew his Indians much better than those who criticised him, and it must be admitted that in Natty Bumppo and Long Tom Coffin he has created characters which are worthy of a lasting place among the characters of fiction.

COOPER, PETER (1791-1883), an American inventor, manufacturer and philanthropist, born in New York City. In 1808 he was apprenticed to a carriage maker, and

while with him he invented a machine for mortising the hubs of carriages, which proved of great value to his employer. Later, Cooper undertook the trade of cabinetmaking, the grocery business and the manufacture of glue. In connection with the latter he made oil, prepared chalk, whiting and singlass and became very wealthy. Having purchased 3,000 acres of land in Baltimore, Cooper erected there the Canton iron works, and in 1830 he constructed from his own designs the first locomotive engine ever made in America, the *Tom Thumb*. Soon after this he sold his iron works in Baltimore, and returning to New York built an iron foundry, which he afterward turned into a rolling mill, making the first rolled iron beams for construction purposes.

In 1845 Cooper removed his works to Trenton, N. J., and built three blast furnaces, the largest then known, bought the Andover iron mines and built a railroad through the eight miles of country to bring the ore to his furnaces. He was a liberal promoter of the Atlantic cable and was president of the New York, Newfoundland and London Telegraph Company. In 1853 he founded Cooper Union for the advancement of science and art and erected a fine building for its purposes (see COOPER UNION). During the financial agitation following the crisis of 1873 he was active in the Greenback movement, and in 1876 he was the candidate of an independent party for President.

COOPERAGE, the art of making vessels from pieces of wood bound together by hoops. Barrels, casks, tubs, firkins and pails are good illustrations of vessels made by cooperage. The parts of a cask are the staves, the hoops and the heads. The staves are widest in the middle and gradually taper toward the ends. This shape produces the bulge in the cask. When vessels are required which do not have the bulge, the staves are straight. If they are the same width throughout, the vessel is a cylinder. If they are wider at one end, the vessel flares, being larger either at the top or bottom.

Formerly all cooperage was done by hand, the cooper carefully shaping the staves and giving the edges the proper slant to fit them together in the vessel, but now the work is done entirely by machinery. The staves are cut by a saw in the form of a cylinder, having teeth upon one end. They are then cut to the proper length by circular saws and

placed upon an edging machine, which gives them the desired finish. The heads are made by matching the boards and fastening them together with pins and glue. When the glue is dry the boards are placed upon a turntable, where they come in contact with a circular saw which cuts them into the desired shape and also trims the edges so that they will fit into the casks. See BARREL.

COOPERATION, *ko op er a'shun*, in social economics, the association of any number of individuals or societies for mutual profit, whether in the purchase and distribution of commodities for consumption, or in the production of commodities, or in the borrowing and lending of capital among members.

The most powerful cooperative force in the industrial system is what economists have termed "the division of labor," and this has its counterpart in the multiform divisions of capital in its application to the maintenance and extension of industry.

Coöperation, as technically understood, occupies a middle position between the doctrines of the communists and socialists on the one hand, and private property and freedom of individual labor and enterprise on the other. It takes its departure from communism at a very definite and significant point. While the latter would extinguish the motive of individual gain and possession in the sentiment of a universal happiness or good and remodel all existing rights, laws and arrangements of society to this end, coöperation seeks to ameliorate the social condition by joining together increasing numbers of associates in a common interest. Cooperators look to ownership and operation by economical organizations of their own rather than by the state.

The cooperative societies, though attended with the most varied fortune, have greatly increased in number and in amount of business in recent years. The form, objects and rules of these associations may be divided into three general classes.

(1) *Societies of consumers*, the object of which is to buy and sell to members alone, or to members and non-members under differing conditions, the necessities of life or the raw materials of their industry.

(2) *Societies of producers*, the object of which is to sell the collective or individual work of the members.

(3) *Societies of credit or banking*, the object of which is to open accounts of credit with their members and advance them loans for industrial purposes.

These societies have taken many forms, such as friendly societies, burial societies, arrangements of private firms by which the workmen share in the profits of the employers (more accurately known as *profit-sharing*), and building and loan societies.

Cooperative Marketing. The relatively small producing unit in agriculture makes it difficult for the individual farmer to follow his products very far on their road to the consumer. The combination of the products of a number of farms in a marketing organization often makes it possible for farmers to improve upon the results obtained in the sale of their product. This may come from the reduction of waste, effecting of economies, improvement of quality, employment of salesmanship, or the rendering of other services. Farmers employ the cooperative rather than the ordinary business company plan because it fits their needs better. They are interested in service and in getting benefits in form of improved returns, rather than as returns on capital.

Cooperative marketing began with relatively simple local organizations such as cheese factories, creameries, and farmers' elevators. Later, larger organizations to enter the terminal markets or sell on a national basis were developed. Of these larger organizations, there are two general types, one, the federated type, in which the central is made up of local or district associations; the other, the centralized type, in which the grower holds direct membership.

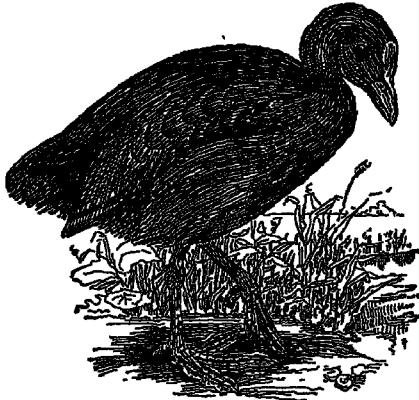
There are over 12,000 farmers' cooperative marketing and purchasing associations in the United States, with a membership of over 3,000,000 farmers. In a recent year, these organizations did a business of nearly two billion dollars. California leads in the value of business handled, because of its immense citrus interests, while Minnesota has the largest number of organizations.

COOT, *loot*, or **MUD HEN**, a bird of the rail family, that lives near and on the water, fleeing to the weeds and grasses when alarmed. The common coot of the United States is a dark slate color, almost black on the head and neck. The toes are not webbed, but have white scalloped bands, which nearly meet. The bill is a dull white.

COPAL, a gum resin yielded by different trees in Africa, South America, India and Australia, and differing considerably in its qualities, according to its origin. In gen-

eral it is hard, shining, transparent and cit-iron-colored. When dissolved in alcohol or turpentine it makes a beautiful and very durable varnish.

COPENHAGEN, *ko pen ha'gen*, DEN-MARK, the capital and largest city of the country, situated on the islands of Amager



COOT

and Zealand. The strait separating the two forms an excellent harbor and is crossed by two bridges. The city is handsomely laid out with gardens and fine buildings. It is the seat of the government and the residence of the king. Among the principal buildings are the Church of Our Lady; Holmens Kirke, dating from the seventeenth century; the Church of our Redeemer; the Roseborg Palace; the Exchange, dating from the seventeenth century; the Glyptothek, containing a very choice collection of sculpture; the new art museum; the royal library, containing 540,000 volumes; the National Museum, and the Thorwaldsen Museum, containing Thorwaldsen's grave and a fine collection of his works of art, which he bequeathed to Copenhagen. Copenhagen also contains a university, the only one in Denmark and the oldest one in Northern Europe. It was founded in 1478, and contains a library of 300,000 volumes.

The city is the chief center of Scandinavian literature, science and art. Ship-building is extensively carried on here, and there are machine shops, sugar refineries, chemical works and textile factories. The commerce is very important, and more than one-half of Denmark's trade passes through Copenhagen. The name means *merchants'*

haven. King Christopher, the Bavarian, in 1443 made the place the capital of the kingdom. It has withstood several sieges, among which was the one by King Charles X of Sweden (1658-1660), when Copenhagen saved the Danish monarchy, and the one by the English in 1807, when a part of the city was destroyed. Population, 1921, 866,159; 1931, 770,000.

COPERNICUS, *ko per'ni kus*, NICHOLAS (1473-1543), a famous astronomer, the first man of science to announce the theory of the movement of the planets about the sun. He was born at Thorn, Poland. Having studied medicine at Cracow, he afterward devoted himself to mathematics and astronomy, and in 1500 he taught mathematics at Rome with great success. Returning to his own country, he entered into holy orders, was made a canon in the Cathedral of Frauenburg and began to work out his new system of astronomy. Doubting that the motions of the heavenly bodies could be so confused and so complicated as the Ptolemaic system made them, he was induced to consider the simpler hypothesis that the sun was the center around which the earth and the other planets revolve.

Besides this fundamental truth, Copernicus anticipated, for he can scarcely be said to have proved, many other of the principal facts of astronomical science, such as the motion of the earth on its axis and the immense distance of the stars, which made their apparent position the same from any part of the earth's orbit. The great work in which Copernicus explained his theory was completed in 1530, but it was not given to the world until twelve years later, because of popular prejudice against new ideas.

COPLEY, *kop'li*, JOHN SINGLETON (1737-1815), an American painter of historical subjects, and of portraits, born in Boston, Mass. He traveled extensively in Europe, and after 1776 he settled in London. He was elected a member of the Royal Academy in 1783. His most celebrated picture is the *Death of Lord Chatham*, now in the National Gallery. Among his famous portraits are likenesses of Mrs. Boylston, in Harvard Memorial Hall, and of Mary Storer, in the Metropolitan Museum.

COPPER, one of the most useful of metals, of a slightly-reddish color and about nine times as heavy as water. This metal is familiar in every household; it forms the

bottoms of teakettles and wash boilers, and other household utensils; the cent of the United States and Canada and the penny of Great Britain are almost entirely of copper (see *ALLOY*). However, it has more important uses in commerce. It forms a part of many alloys, being one of the ingredients in gun metal, brass and bronze. Electrical machinery and electrical apparatus of all kinds must have copper parts, and the vast mileage of telephone and telegraph wires are of copper. Street-car trolley wires for conveying the electric current are of copper. In war copper is an absolute essential for casings for shells.

It derives its name from the Latin word *cuprum*, the name for Cyprus, the island on which the copper used by the Greeks and Romans was obtained. Next to gold, silver and platinum, copper is the most ductile and malleable of metals. It is more elastic than any other metal except steel, and the most sonorous of all except aluminum. As a conductor of heat and electricity it ranks next to silver. It has a disagreeable odor, and a nauseous metallic taste. It is not acted upon by water, but tarnishes when exposed to the air, becoming covered with a green carbonate.

Distribution. Copper occurs native in crystals, threads and thin plates. In some of the older rocks, blocks of native copper weighing several tons have occasionally been obtained. The ores are numerous and abundant. The most important of these are compounds of copper with silver, oxygen, carbon or iron, such as copper glance, gray copper and copper pyrites or yellow copper. Nearly all of these ores also contain more or less lead and silver, and in their reduction these metals are obtained.

Copper is found in paying quantities in more than twenty nations. In average years the United States is first in yield, followed by Chile, with Canada third and Rhodesia fourth. The Belgian Congo is forging ahead. The United States produces more than a third of the world's total, somewhat more than 250,000 tons a year, on the average. Canada's copper averages about 190,000 tons a year. The leading producing regions of the United States are from Montana southward, and Michigan. The first four states in order of production are usually Arizona, Montana, Utah, and Michigan. In some years this order of precedence changes a little. See *Bronze*.

Reduction of the Ore. In extracting copper from the rock at the Lake Superior mines, all that is necessary is to crush the rock and separate the copper from it by washing. This is then melted. The process of separating it from ore containing sulphur is somewhat complicated. The ore is first crushed, then concentrated, that is, caused to pass over a number of tables which have a vibratory motion and over which water is flowing. By this process the particles of rock not containing ore are separated out and rejected. The concentrated ore thus obtained is heated to redness, or roasted, for the purpose of driving off the sulphur. The ore is then smelted and an impure copper is obtained. This is usually sent to the eastern markets, where it is refined. Some of the ores are successfully treated by electrolysis (see *ELECTROLYSIS*), the use of a powerful electric current being employed instead of heat for extracting the metal.

Compounds. There are a number of compounds of copper, and all of them are exceedingly poisonous. Native carbonates, known as *malachite* form beautiful cabinet specimens, since they are of a brilliant green or blue color. Some of the largest pieces of this rock are sometimes cut and polished for mantels and table tops, and quite a good deal of it is used in the manufacture of small ornaments.

COPPERAS, sulphate of iron or green vitriol, a salt of a peculiar puckery taste and of a fine green color. When exposed to the air it assumes a brownish hue. It is much used in dyeing fabrics black and in making ink, and in medicine as a tonic. The copperas of commerce is usually made by the decomposition of iron pyrites.

COPPER GLANCE, a copper ore of a leadish or iron gray color, containing eighty-one parts copper and nineteen parts sulphur. In the United States it occurs in the copper mines of the Lake Superior region and in the mines of New Mexico and Arizona, near the Gila River, and also in small quantities in New Jersey and Connecticut. Cornwall (England), Sweden and Germany contain deposits. When occurring in crystals copper glance forms beautiful specimens.

COPPERHEAD, a North American snake, about three feet long, of a golden or bronze color, that has a bright copper-colored head. On the body are V-shaped dark blotches which meet upon the back.

The copperhead is a sluggish snake, appearing usually only at night, and it is not inclined to bite unless frightened or disturbed. It is one of the three poisonous snakes of the Northern states and has many names in different localities; among them are cotton-mouth, moecasin and red adder.

COPPERMINE RIVER, a river of northern Canada, near Copperhead Mountains. It rises in Point Lake and flows into Coronation Gulf in the Arctic Ocean. This river is about three hundred miles long and contains a great number of waterfalls and torrents, which render it useless for travel.

COPPER SULPHATE, *sul'fat*. See BLUE VITRIOL.

COPRA, *kop'ra*, the dried kernel of the cocoanut, which yields an oil used in the manufacture of soap and candles. Copra is obtained in large quantities from the islands of the Pacific, and is an important article of commerce. The cocoanut meat is dried in the sun or in a kiln, and also by hot air, the latter method producing a higher percentage of oil. One gallon is the average yield of thirty cocoanuts. The cake remaining after the oil is extracted is utilized as fodder and manure.

COPTS, *kopts*, a class of people, resident in Egypt, who observe a rude form of the Christian religion and who are supposed to be a relic of the old Egyptian race who built the monuments. By association with the Moslems they have acquired many Moslem customs and are losing their distinctness as a people. The men wear a black or brown turban and a long gown, with sometimes a black coat or jacket over it. The religion of the Christian element of Ethiopia is Coptic.

COPYING DEVICES, devices for duplicating letters and manuscripts without re-writing them. One of the oldest processes is by the letterpress, which usually consists of a book containing leaves of tissue paper and a press. The instrument to be copied is written in copying ink, either with a pen or upon the typewriter; this ink contains sugar or some other substance that prevents its drying rapidly. After writing, an oil-back is placed under the leaf in the book. The leaf is then dampened and the article to be copied is laid face down upon it, with another oil-back to protect the book from the moisture. The copying book is then placed in a press which works with a lever or screw,

and when pressure is applied the writing is transferred to the dampened page of the book. This form of copying is now almost obsolete.

Copies of typewritten letters, etc., are now made on the typewriter by the use of sheets of carbon paper. This paper has one side covered with a coloring matter which, when struck with the die of the typewriter or pressed with a pencil, is transferred to the surface of the sheet lying next to it. In copying, the carbon is laid next to the sheet upon which the writing is produced, with its colored surface lying upon another sheet of paper, and as the writing proceeds either with pencil or typewriter, the ink from the carbon is impressed upon the second sheet of paper. By employing two or three carbons, as many copies can be made from one writing.

Devices for producing a larger number of copies from writing are the hectograph and the mimeograph.

The Hectograph. This device consists of a pad or tablet, made by mixing gelatin and glycerin in proportions of two ounces of gelatin to thirteen ounces of glycerin. The gelatin should be dissolved in water and the glycerin heated before mixing. The mixture should then be boiled for several hours over a salt water bath, then poured into a shallow pan. The ink used is usually an aniline ink containing a small proportion of glycerin. The copy is written upon ordinary paper, which is then laid face down upon the hectograph and carefully rubbed with the hand or a cloth, when the ink is transferred to the surface of the hectograph. The copy is then removed and as paper is pressed down upon the hectograph, a slight portion of the ink adheres to it so as to reproduce the writing. The hectograph principle is embodied in improved devices bearing numerous trade names.

The Mimeograph. This machine was invented by Thomas A. Edison, and works on the principle of the printing press. It consists of a corrugated steel plate which resembles a very fine file, and a specially prepared linen paper which is coated on one side with paraffin wax. By writing on the paper with a stylus, over the steel plate, the wax is cut through, forming a stencil. The stencil is then placed in a frame and so adjusted that the paper upon which the impressions are to be made is easily placed under it and removed. The ink is applied by a roller similar

to that used in the hand printing press. As the roller moves over the paraffin paper, the ink passes through the stencil, reproducing the writing on the paper beneath. From such a stencil from one hundred to three hundred copies can be made. A recent modification of this mimeograph consists of a rotary apparatus, working very much on the plan of a cylinder printing press. The stencil is made on the paraffin paper by the typewriter. This is then attached to the cylinder and inked upon the inner side. As the cylinder revolves, the stencil is brought in contact with the paper upon which the copy is printed. By one of these devices several hundred copies can be made from one stencil.

The Multigraph, the most perfect device for printing letters or circulars which have the appearance of typewritten documents. The essential feature is a long cylindrical drum, in two parts, one of which revolves. Each drum contains slots running across its face. In the slots of one of these drums metal type reposes; the various letters are pushed into the slots of the stationary drum, and arranged line by line, to compose the subject-matter to be printed. When all the type lines are in position they are made secure. Printing is accomplished by revolving the type drum, after the manner in which a cylinder printing press operates, the sheets of paper passing beneath the drum and receiving the type impression, after the type has come in contact with an inked ribbon.

COPYRIGHT, the legal protection extended to an author or publisher by which he is guaranteed the exclusive right to publish or sell his literary, musical or artistic productions. It is protection against those persons who, if not restrained by penalties, might appropriate the work of others and commercialize it for their own benefit, thus robbing the rightful owners of the fruits of their labor.

In the United States. The Constitution (Art. I, Sec. 8) empowers Congress to—

- “ . . . promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries ”

• Thus were copyrights and patents made possible in the United States. See **PATENT**

The copyright laws have been several times amended, the last time in 1928. To obtain a

copyright, send to the Register of Copyrights, Library of Congress, Washington, D. C., for an application blank. Fill out this blank and return it with a postal money order or bank draft for \$2.00, and at the same time send two copies of the edition of the publication which is to bear the copyright imprint, which should appear on the title page, or the page following (for example, see this volume). Other details can be obtained from the Register. Dramatic and musical compositions and works of art are subject to the same copyright as books. The exclusive right of performing such compositions not printed, or of causing them to be performed, belongs to the author.

The copyright office does not protect the rights of an author or publisher in court. If copyrighted material is used unlawfully a suit at law in the United States District Court is the means of redress. The copyright office is only a place of record; its records showing the granting of copyrights and priority of ownership are available in the trial of cases, and are accepted by the courts as unimpeachable evidence.

A copyright is granted for a term of twenty-eight years, and it may be renewed one year before its expiration for a like term. After fifty-six years all protection is withdrawn. A work to be copyrighted in the United States must be printed from type set in that country.

In Canada. Copyrights in Canada are issued in a manner similar to the plan employed in the United States. The copyright office is in charge of the Department of Trade and Commerce, Patent Office Branch. By the acts of 1921 and 1923, the term of copyright extends during the lifetime of the author and fifty years after his death. To obtain a copyright the author must be a British subject, a subject of a foreign country adhering to the Berne Convention, or a resident of His Majesty's dominions. If the owner of the copyright fails to print his book in Canada, the government may grant a license for the publication, the licensee paying a royalty to the owner.

International Copyright, a mutual agreement between nations as to copyright privileges. In March, 1891, the United States Congress passed an international copyright act. Under it agreements have been made with most countries by which works may be copyrighted therein, under special rules

COQUELIN, *le ténor*, a distinguished family of French actors.

Benoît Constant Coquelin (1841-1909), the most famous of the family, was trained for the stage at the Paris Conservatoire. After a successful career in France he visited the United States in 1888, winning high praise, and again in 1900-1901 he pleased American and Canadian audiences, this time as Sarah Bernhardt's leading man in her production of *L'Aiglon*. Among other rôles which he portrayed with success were the leading male parts in *The Marriage of Figaro*, *The Misanthrope*, *The Barber of Seville* and *Cyrano de Bergerac*. Coquelin was extremely versatile and could adapt himself to a wide range of parts. His acting charmed because of its directness and naturalness, and he had perfect mastery of technique.

Ernest Alexandre Honoré Coquelin (1848-1909) was a younger brother of the foregoing. He also was trained at the Conservatoire, and at his graduation received the first prize in comedy. He played in a number of dramas with his brother, and also won a reputation as the author and reciter of monologues.

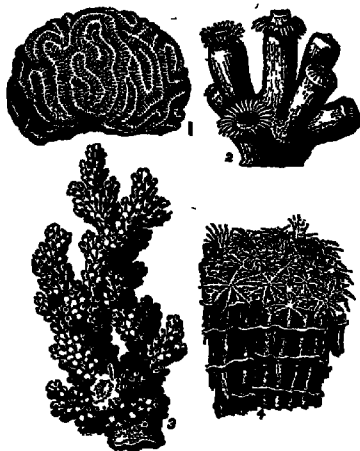
Jean Coquelin (1865-), son of Constant Coquelin, studied under his distinguished father in Paris. In 1897 he created the rôle of Ragueneau in *Cyrano de Bergerac*, and later played in *Thermidor*, *More than King* and other plays.

CORAL, the limestone skeleton formed by minute sea animals belonging to a family closely resembling sea anemones. The skeletons take many beautiful forms, and coral is a valuable material for jewelry.

The animal, which is really a *polyp*, is commonly known as the coral insect. It consists of a jelly-like mass, in the center of which is a sac which serves as a stomach. Radiating from this are minute arms, which assist the polyp in clinging to the rock and in drawing food into the stomach. There are numerous species of coral polyps, each of which builds a coral peculiar to itself. *Tree coral*, which is so named because it resembles the branches of a tree, is formed by a polyp that propagates by buds, which spring from its sides in such a way as to constitute the branches. Another species forms a coral resembling bundles of straw fastened together, and known as the *organ-pipe coral*. Still another forms a coral re-

sembling in its shape and convolutions the human brain. This is known as the *brain coral*. The most common and widely distributed polyp is that which forms the *reef coral*.

In color corals range from pure white through yellow, pink and red, to black. The pink, red and black varieties are highly



CORALS

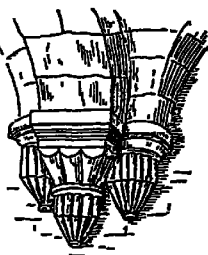
- 1, brain coral; 2, coral showing polyps, 3, tree coral 4, organ-pipe coral

prized for jewelry and other ornamental purposes. The pink and red are found in the Mediterranean, and because of their value coral fisheries are maintained off the coasts of Southern Europe and of Northern Africa. The corals are procured by a grappling apparatus which is dragged over the bottom of the sea and breaks off the coral and holds it until it can be drawn to the surface. These corals take a high polish and are wrought into jewelry, necklaces and other ornaments, the chief centers of the industry being Naples and Genoa. In value they vary according to their color and fineness, the most beautiful specimens bringing a high price.

Coral reefs are found in nearly all tropical waters, and in some localities, as off the coast of Australia, they are of great extent. The reef-building coral will not live in water that falls below a temperature of 60°. It begins building upon the bottom of the sea and each generation builds upon the skeleton formed by the one preceding it, so that in the course of centuries these

little animals have built up great barriers that rise above the surface of the water. The reef as built by the coral polyp, however, does not approach within five or six feet of the surface, as the animals cannot live above that level. The upper portions of the reef are built up from broken pieces of coral or other rock lodged upon the original reef by the action of the waves. These finally reach the surface; soil is formed by the powdering of the coral; in this earth seeds lodge and plants spring up. Reefs thus built around the coast of submerged volcanoes take a circular form and enclose a lagoon of quiet water (see *ATOLL*). The study of the various rock formations of the earth shows that the coral polyps have been working for many ages.

CORBEL, in architecture, a piece of stone, wood or iron projecting from the vertical face of a wall, to support some part of the building. Corbels are of a great variety of forms and are ornamented in many ways. They were used especially in Gothic architecture, and appear in the decorative schemes of modern Gothic buildings in all great cities. See *CONSOLE*.



CORBEL

CORCORAN ART GALLERY, a famous collection of works of art in Washington, D. C., founded and endowed with a fund of \$900,000 by William W. Corcoran (see below). There are many remarkable sculptures, paintings and ceramics in the collection, which is housed in a beautiful building near the White House. Among the works of great merit are Powers' *Greek Slave* and Velas' *Dying Napoleon*. A free school of art is connected with the institution.

William Wilson Corcoran (1798-1888), founder of the collection, was born in Georgetown, now a part of Washington, D. C. In 1828 he had charge of the real estate held by the United States Bank in the District of Columbia, and continued as their agent until 1836. In 1837 he began his career as banker and broker in Washington, and during the Mexican War, by his connection with the placing of government loans, he acquired an immense fortune. In 1854 he retired from

the banking business and gave much of his time to philanthropy.

CORDAY d'ARMONT, *kor da' dahr mahN'*, MARIE ANNE CHARLOTTE (1768-1793), commonly called Charlotte Corday, a famous figure of the French Revolution. She was born in Normandy. Her lover, an officer in the garrison of Caen, was accused by Marat as a conspirator against the Republic and was assassinated by villains hired for that purpose. Thus, as well as a deep-rooted hatred against all oppressors, determined Charlotte Corday to free her country from Marat. Having obtained an interview with Marat at his own house, she plunged her dagger into his bosom and gave herself up to the attendants who rushed in at his cries. After her trial and conviction she suffered death by beheading. See *MARAT*, *JEAN PAUL*.

CORDILLERA, *lawr dil'yah rah*, or *kawr dil'er ah*, or **CORDILLERAS**, a term applied to the mountain system which extends along the western coast of North and South America from Alaska to the southern point of South America. It includes the Rocky Mountains, the Sierra Nevadas and other ranges in the United States, several ranges in Mexico, Canada and Alaska, and the Andes in South America. The term is sometimes used in a more general way to denote any extensive mountain system. The name is from the Spanish for *cord* or *string*. See *ROCKY MOUNTAINS*; *ANDES*; *SIERRA NEVADAS*.

CORDITE, a powerful smokeless gunpowder, so named because it is manufactured in the form of a cord. It is made up of about eighty parts of nitrocellulose, fifteen of nitroglycerine and five of vaseline. Cordite burns slowly when lighted, but explodes when it strikes its mark, due to pressure. It is used in small arms and in cannon.

CORDOBA, or **CORDOVA**, ARGENTINA, capital of a province of the same name. It occupies a beautiful and well-sheltered site in the valley of the Primero, at an elevation of 1,200 feet. Among the notable buildings are a cathedral, a government palace, a library and several hospitals. Here are located a well-equipped national observatory and a national university, founded in 1613. In 1934 it had nearly 2,800 students. The city is an important commercial center, and it exports quantities of hides, wool and live stock. Among the manufactures are lime, bricks and flour. Population, 1934, 280,000.

COR'DUROY, a thick, cotton stuff, having a cut pile like velvet, but corded or ribbed on the surface. It is a popular fabric for garments worn out of doors, and is sometimes used to cover furniture and for fancy work.

A *corduroy road* in the United States is a rough road over swampy or marshy places, made by laying logs side by side across the driving path.

COREA, or **KOREA**, the name by which Chosen was known previous to its annexation to Japan in 1910. See **CHOSEN**.

CORELLI, *ko rel's*, **MARIE** (1864-1924), a popular writer of novels of the sensational type. She was born in Italy and was educated in England and France. Charles Mackay, a song writer, adopted her as his daughter in her childhood. Her permanent residence was Stratford-on-Avon. Miss Corelli's first work, *The Romance of Two Worlds*, appeared in 1886. Among her other works are *Thelma*, *Barabbas*, *The Sorrows of Satan*, *The Master Christian*, *The Life Everlasting* and *The Secret Power* (1921). She was also a proficient musician.

CORIANDEER, *ko ri an'der*, a plant of the parsley family, native of Italy and cultivated in other parts of Europe, and to a certain extent in North America. The whole plant has an unpleasant smell, but the fruit, improperly called seed, is very agreeable and aromatic when dry. It is used in medicine as a remedy for dyspepsia, and as an ingredient in cookery and confectionery.

CORINTH, *kor'inth*, the name of a city, gulf and isthmus, well known to the ancient world, and of considerable interest at the present time.

Corinth, the city, was one of the great trading centers of ancient Greece. Situated at the southern tip of the isthmus which joins the Peloponnesus to the northern part of Greece, it possessed all the splendor which wealth and luxury could create, and its citadel, nearly 2,000 feet high, rendered it a strong fortress. It had two harbors, Lechaum, on the west side of the isthmus, and Cenchreæ, on the Gulf of Athens, or Aegina. Corinth was famous as the place where the Isthmian games were held. It was also one of the most magnificent and one of the most voluptuous cities of Greece, but of its famous works of art, there remain only seven massive pillars of a temple to Apollo.

The city was conquered and destroyed by

the Roman consul, Mummius, in 146 B. C. Julius Caesar rebuilt it about one hundred years later, but its commerce could not be restored, though it became a place of note and importance. After its conquest in 1458 by Mahomet II, it was held by the Turks till 1823, except from 1687 to 1715, when the Venetians held it. Saint Paul lived here a year and a half, and two of his epistles are addressed to the Corinthians. The present town, called New Corinth, lies three miles northeast of the ancient city of Corinth. Population, about 5,000.

The Gulf of Corinth, or Gulf of Lepanto, extends through the center of Greece about eighty miles. Its shores, varied by rocky capes and fertile plains, and its high mountains farther inland, furnish beautiful scenery.

The Isthmus of Corinth, connecting the Peloponnesus with Northern Greece, is about ten miles long and varies in width from four to eight miles. Here, where the wall built to protect it from northern invasions terminated on the gulf, the Isthmian games were celebrated. A canal across the Isthmus, completed in 1893, connecting the gulf of Corinth with the Saronic Gulf, enables the largest vessels to pass through. At the eastern end of the canal is the town of Isthmia, at its western, Poseidonia.

CORINTH, Miss., the county seat of Alcorn County, ninety miles southeast of Memphis. The place had an interesting history in the Civil War. It was a point of strategic importance, since it was the junction of two railroads at right angles to each other. It was fortified by the Confederates, but was evacuated after the Battle of Shiloh, May 29, 1862. On October 3 of the same year, Generals Van Dorn and Price with 22,000 Confederates attempted to recapture Corinth, defended by Rosecrans with 20,000 Federals. In spite of the greatest valor on the part of the Confederate troops, the attack was repulsed. The Confederates lost nearly 5,000 in killed, wounded and captured, while the Union forces lost about 2,500. Population, 1930, 6,220.

CORINTHIAN ORDER. See **COLUMN**.

CORINTHIANS, *ko rin'thi ans*, **EPISTLES TO THEM**, the name given to two letters which Paul addressed to the Church at Corinth, about A. D. 57. These Epistles were occasioned by dissensions in the Church and by reports brought to Paul of certain un-Christ-

dian practices among the Corinthians. The first Epistle contains the famous chapter (XIII) on love, in which the Apostle says, "And now abideth faith, hope and love, these three; but the greatest of these is love," (Revised version). The second Epistle, which differs much from the first, exhorts the people to be steadfast in the faith, and contains personal testimony concerning Paul's own experiences.

CORIOLANUS, *ko ri o la' nus*, the hero of a familiar story of the early Roman Republic. In 491 B C, when the people were suffering for lack of food, he suggested that they be deprived of grain unless they agreed to give up their tribunes. Coriolanus, to escape the wrath of the people, fled to the Volscians, whose armies he led to the gates of Rome. Only when his aged mother begged him with tears to save the city did he lead the enemy away. Shakespeare's play *Coriolanus* is based on this legend. See **TRIBUNE**.

CORK. The tough, elastic, woody substance from which are made stoppers for bottles, is the thick bark of a species of oak tree which grows in Spain, Portugal and other parts of Southern Europe and in the north of Africa. Cork is light, elastic, impervious to water, and by pressure can be greatly reduced in bulk, returning again to its original size. It is only one-fourth as heavy as water.

The outer bark of the cork oak falls off of itself if left alone, but for commercial

has reached the age of from fifteen to thirty years. The first stripping yields the coarsest kind of cork. In the course of eight or nine years or even less the same tree will yield another supply of bark of better quality, and the removal of this outer bark is said to be beneficial, the trees thus stripped reaching the age of one hundred and fifty years or more.

The bark is removed by a kind of ax, parallel circles being cut round the tree and united by longitudinal cuts, so as to produce oblong sheets of bark. These vary in thickness between three-fourths of an inch and three inches. Care must be taken not to cut into the inner bark or the tree will be killed. The pieces of cork are flattened out by heat or by weights and are slightly charred on the surface to close the pores.

The cork is sorted into different grades, after which it is put into sheet-iron boxes and steamed, so it will not take the temper out of the circular knives or punches which shoe up the cork and make it into stoppers. It is also used for making life-preservers. The small bits of cork remaining from a sheet used for such purposes is granulated and used in the making of linoleum, for packing for refrigerators and for other insulating materials.

CORK, a city in the south of Ireland, capital of the county of Cork, situated on the River Lee, 137 miles southwest of Dublin. It is built partly on an island and partly on the banks of the river, which is crossed by nine bridges. It has a large, safe harbor, formed by the estuary of the Lee at the mouth of which is the port of Cobh. The city has four monasteries, a fine cathedral, a free library, schools of science and art, Queen's College, a large park and many beautiful residences. Cork has a large export and import trade. The principal manufactures are leather, iron, glass, gloves, paper and liquors. There are also iron foundries, yards for the building of iron ships and important fisheries. Cork was founded in 622, was taken by Cromwell in 1649 and in 1690 by Marlborough. Population, 78,490.

CORLISS, GEORGE HENRY (1817-1888), an American inventor, born at Easton, N. Y. The construction of stationary steam engines was revolutionized by his improvements, the most important being the introduction of a cut-off mechanism, by which the valves are opened and closed instantaneously. Corliss invented many ingenious devices, and fur-



CUTTING CORK FROM TREE

poses it is stripped off when judged sufficiently matured, this being when the tree

nished the Corliss engine which moved all the machinery at the Philadelphia Centennial Exhibition in 1876.

CORM, from the Greek *kormas*, which means *the trunk of a plant or tree with branches removed*, a name which defines a solid underground stem related to tubers and to bulbs. Corms are very commonly referred to as bulbs, which they closely resemble; they are more properly root-bulbs. Among the conspicuous examples of plants with corms are the gladiolus, cyclamen, crocus and Indian turnip. See **BULB**.

CORMORANT, a large web-footed bird, having a long and strongly hooked bill, a long neck, short wings and a rather long, rounded tail. The cormorants, of which there are several species, are excellent swimmers and divers, and yet they often



CORMORANT

perch on trees. In color they are generally black or dark. The double-crested cormorant is found occasionally in the inland waters of the United States and often along the coast. The common European cormorant is larger than a goose, but has smaller wings. The Chinese have for many centuries trained the cormorants to fish for them, which they do very successfully, obediently bringing the fish to their masters without mutilation. When thus employed strings are tied around the necks of the birds, to make it impossible for them to swallow the fish they catch. Two fishermen in one boat can handle fifteen or twenty cormorants with ease.



A corn-club boy.

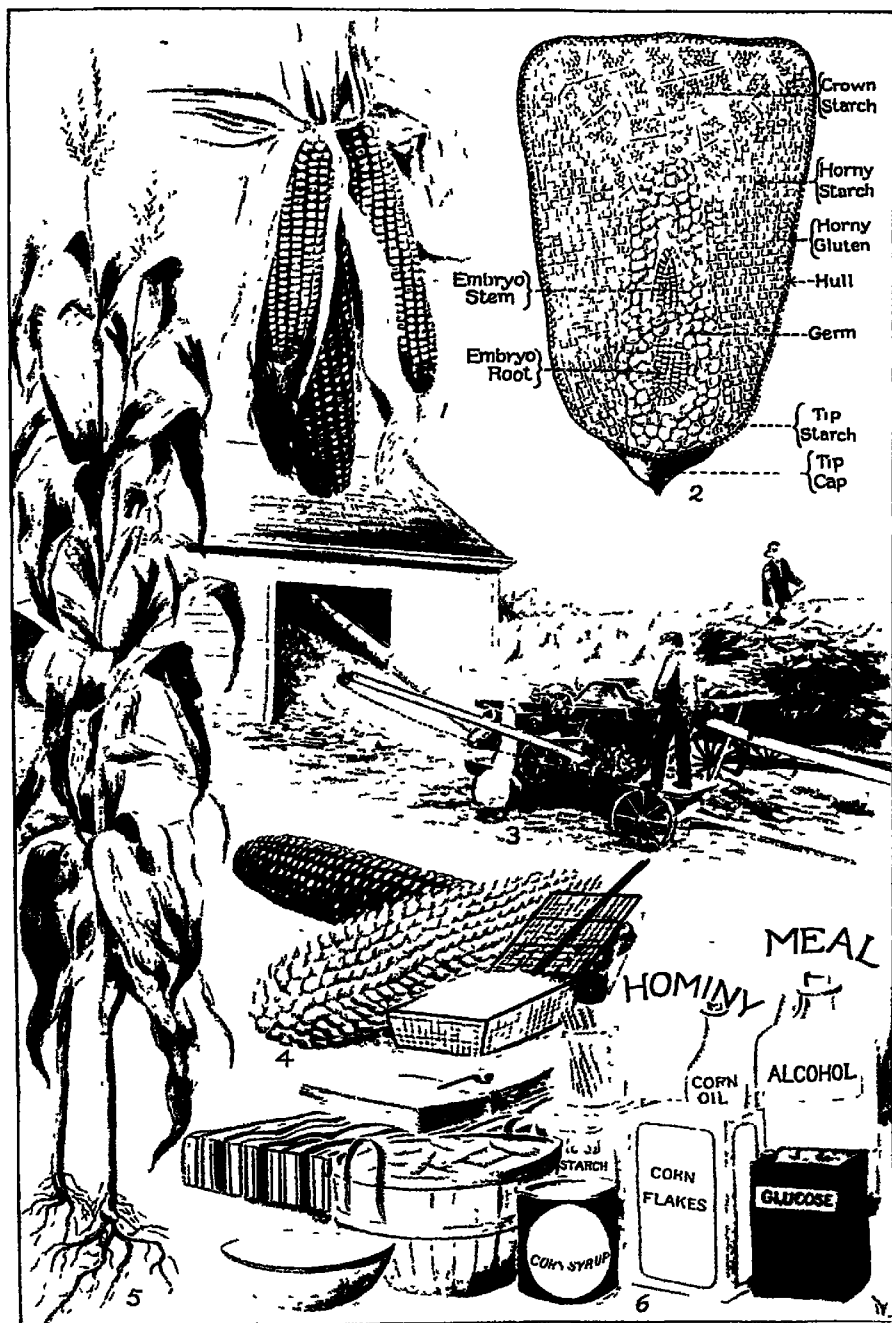
CORN, the most important agricultural product of the United States in value of crop, acreage and production, and one of the most valuable food plants in the world. Though it has not the importance of wheat as a bread food, it is the basis of successful farming, for upon it depends the raising of all food animals and therefore the production of such commodities as wool, hides, milk, eggs and butter. And since work animals, too, are fed on corn

and hay, the production of other grains is dependent on the corn crop. The corn plant is often used as an emblem of bountiful harvests, and especially as a symbol of the prosperity of the American republic. Edna Dean Proctor's charming poem *Columbia's Emblem* expresses this idea in these lines:

The rose may bloom for England,
The lily for France unfold,
Ireland may honor the shamrock,
Scotland her thistle bold;
But the shield of the great Republic,
The glory of the West,
Shall bear a stalk of the tasseled Corn,
Of all our wealth the best!

Description. Corn belongs to the grass family. In general appearance it resembles the sugar cane and sorghum. The stalks are from four to twelve feet high, according to the variety, are jointed at frequent intervals, are of a dark purple and green color and are concave on one side. Their leaves are long, slender and pointed, and are of a dark green color. The fruit, called the *ears*, grow from the axils of the leaves. Corn bears two kinds of flowers, those at the top of the stalk, bearing the stamens and forming the *tassel*, and those on the ear, constituting the *silk* and bearing the pistils. Each thread of the silk is a pistil which terminates in a kernel. The seeds, or kernels, are arranged in rows around a thick stem called the *cob*. The ears may have eight or twelve or more rows, but they always have an even number. They are covered with long slender glumes called *husks*.

Corn is a native of America and was not known previous to the discovery of the New

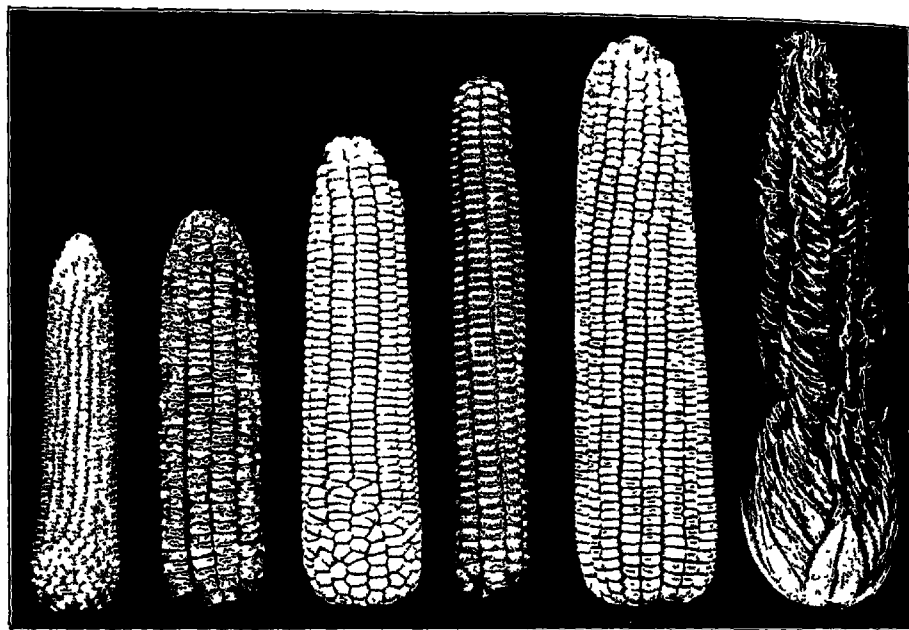


CORN

1. Cluster of Ears
2. Detail of Kernel

3. Husker and Shredder
4. Popcorn

5. Corn Plant
6. Corn Products



NORTH AMERICA'S SIX TYPES OF CORN

Pictured from left to right, they are pop, sweet, flour, flint, dent, and pod corn.



A STEP IN THE PROCESS OF FEEDING THE WORLD

On most farms strong backs and pliant muscles are called into service to tie the great shocks of corn, for in this harvest machinery is slow in displacing hand labor.

World. Columbus and other early explorers found it in general use among the Indians, for whom it constituted the chief article of food. From this circumstance it came to be known as Indian corn, but the qualifying term is now heard very seldom. The native name was *maize*, a term still in use in Europe, where *corn* is a general term for grain. In its native state the plant belongs to the warm temperate and semitropical regions, but by cultivation it has been made to extend over a wide range of latitude, in the United States being cultivated as far north as the 46th and 47th parallels.

Types and Varieties. There are many of these; those adapted to the short seasons of the cool temperate regions are much smaller in stalk and seed than those growing in the warmer portions of the corn belt. The important varieties are the flint corn, dent corn, sweet corn and pop corn. *Flint* corn has a small stalk, seldom exceeding six feet in height, and small, closely compact ears and very hard kernels. Its color is either white or a deep yellow. The yellow variety is the corn generally raised throughout New England, New York and the northern portions of Wisconsin and Minnesota. The *dent* corn contains the largest number of varieties and is by far the most important. This is the corn grown all over the region known as the corn belt of the United States and furnishes nearly all the crop raised in the country. It takes its name from the peculiar form of the kernels, which have an indentation on the outer end and taper to a point. Under suitable conditions the stalks attain a height of from eight to ten feet and sometimes grow as high as twelve or fourteen feet, but this is uncommon. *Sweet* corn contains a larger proportion of sugar than the other varieties, its small kernels are soft and nutritious, and it is raised for food, being eaten green or canned in large quantities. *Pop* corn takes its name from the peculiarity of the kernel of cracking open when heated. The kernels are small and enclosed in an exceedingly tough outside covering. When heated, the steam arising from the moisture in the interior bursts this covering and causes the kernel to turn itself inside out.

Cobless Corn. Not a great deal of attention has been given to the feat of producing corn without the cob on which we have thought Nature intended it to grow. It has

been accomplished by Luther Burbank, although he doubts that practical results will be reached. He believes a small cob will be better than entire elimination of the cob. A stalk of cobless corn is shown in the illustration accompanying the article on Burbank.

It is believed that the earliest corn was cobless. Burbank's present cobless corn illustrates the steps backward in evolution towards its original form. The decrease in size of the cob increases the quantity of kernels. It is expected of this corn that instead of merely adding one kernel to the ear it will ultimately double the number of kernels to the ear, for the energy now going to waste in the large cob will be transferred into the production of more kernels. Practically cobless corn offers a great benefit to the farmers, for if there is even one kernel increase to each ear this would mean a total crop increase of 5,000,000 bushels per annum in the United States alone.

Growth and Harvesting. Corn is planted, cultivated and harvested almost entirely by machinery. The seed is planted in rows about four feet apart, and the hills are the same distance from one another. As soon as the young plants appear the cultivation begins and must be continued every few days until the plants become so large that they are liable to injury from the cultivator. The crop is then allowed to ripen. The methods of harvesting depend upon the use for which the crop is intended. If only the ears are desired, the plants may be left standing until the seed is thoroughly ripened and dry. The ears are then broken off, husked and placed in granaries. But if the stalks are desired for fodder, the plants must be cut before the ears are dry, otherwise they will lose much of their nutriment (see **SILAGE**). Corn harvesters are now in general use on the large farms.

Corn Products. Every observing boy and girl can name many uses to which corn is put, but few people know that the entire range of useful things derived from corn covers nearly two hundred items.

Chemists have shown how a good grade of paper can be made from parts of the stalk—newspapers and at least two books have been printed experimentally upon such paper. One hundred pounds of cornstalks can be made to produce a gallon of alcohol—possibly a future motor fuel. The sticky surface of postage stamps is made from

dextrin, a corn product. The starch in corn comes to the dining table in numerous foods, it is also the base of many other commodities, and is a filler in many more, such as explosives, cosmetics, fireworks, glue, ink, shoe polish, tanning material, and sizing.

The oil in the kernel is an ingredient in the making of varnish, soap, automobile



UNITED STATES, 2,700



ARGENTINA, 210



UNION SOUTH AFRICA, 190



RUMANIA, 107



ITALY, 105

LEADING COUNTRIES IN CORN PRODUCTION

Figures represent millions of bushels grown in average years.

tures, glycerine, dyes, oilcloth, and paints. Corncobs are not waste material. From them are made gums for labels; an incredible number of corncob pipes are made, for they produce a cooling smoke; the farmer who first used corncobs for fuel was doubtless surprised to find that they have about one-third the fuel value of hardwood; several varieties of mattresses are stuffed with pulp derived from them. Cornsilks contain ingredients that find uses in medicines.

Food Value. Corn and wheat have about the same food elements and practically the same food values, as both are rich in starch and sugars (carbohydrates) and in protein. Wheat, however, is rich in gluten, while the reverse is true of corn. It is the sticky property of gluten that makes wheat so admirable a grain for leavened bread, and gives it its superiority as a human food. All preparations of corn flour are very nutritious and well repay using as substitutes for wheat.

Production. The United States produces more than two-thirds of the corn crop of the world, in average years. The annual crop ranges from 2,100,000,000 bushels upward; one year (1920) it was 3,208,500,000 bushels; nearly every year it is in excess of 2,500,000,000 bushels. Production in the states varies from year to year, but Iowa is always first, Illinois second. Sometimes

Nebraska is third, but usually Indiana has this honor, with Texas, Ohio, Minnesota, or Wisconsin in fourth place. Corn is the most valuable single crop in the United States, considerably ahead of wheat and cotton, often worth as much as both of those crops combined. Other countries producing corn in considerable quantities are Canada, Mexico, Argentina, Chile, Uruguay, Austria, Hungary, Bulgaria, Rumania, Italy, Russia, Spain, India and China.

The ordinary farmer within the great corn belt produces an average yield of less than 40 bushels per acre. The more careful farmers get an average of about 60 bushels per acre. From observation it has been noted that while the cost of growing a 60-bushel crop is but slightly greater than the cost of growing a 40-bushel crop, the profits are more than doubled. Yields of 80 bushels per acre are not uncommon in all sections of the great corn belt, and crops of as many as 100 bushels to the acre have been obtained under unusually favorable conditions.

In Canada the average annual yield is about 60 bushels to the acre. The total crop



IOWA, 325



ILLINOIS, 250



INDIANA, 110



NEBRASKA, 95



WISCONSIN, 92



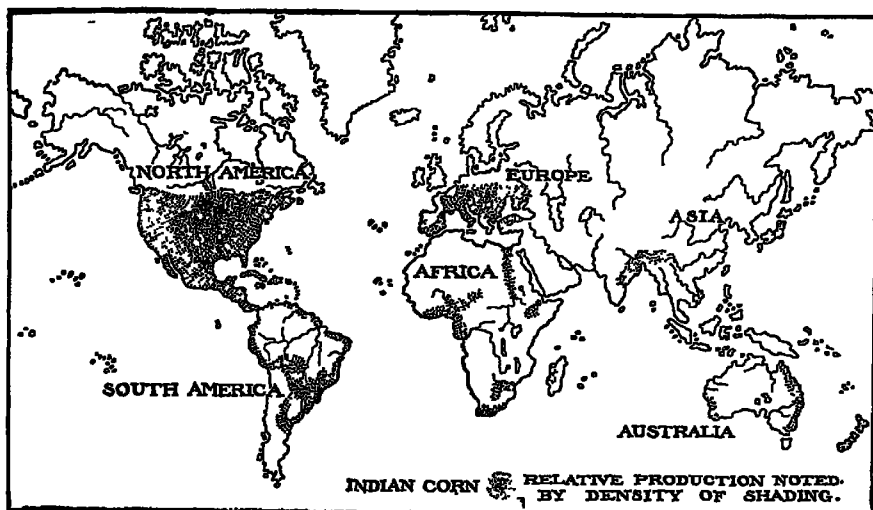
OHIO, 88

STATES LEADING IN PRODUCTION

Figures represent average yield per year, in millions of bushels.

for Canada is generally about 20,000,000 bushels, but the output was reduced during the World War because of shortage of labor. The cost of producing the crop is much higher in Canada, but the net profit is about the same.

Loss Through Waste and Pests. The United States Department of Agriculture declares that every 100 pounds of cornstalks will yield a gallon of alcohol; in not utilizing this by-product the agriculturist has been allowing a very great amount of wealth to go to waste. No man with the interests of his fellow-being at heart would advocate an increase of the production of alcohol for improper uses. We do not like to think that any helpful drug produces drunkards and all



the ills that follow in the train of drink, but there are many legitimate uses for alcohol, and were it more plentiful and cheaper, the opportunities to use it would multiply.

If one acre of corn will yield from 10 to 12 tons of cornstalks, which is about 20,000 pounds, that amount of raw material would produce easily 1,200 or 1,300 pounds of alcohol, or over 200 gallons. The returns from such conversion can be easily figured.

If ground in a wet condition, then dried, cornstalks may be kept indefinitely and be held ready at any time for manufacture into alcohol. The alcohol derivable from cornstalks that now go to waste in this country would not only drive all the machinery of our factories, say the government authorities, but would furnish the requisite power for all our railroads, steamboats, run all our automobiles, heat and illumine all our houses and light the streets of every city in the Union.

In recent years the European corn borer has proved a serious pest of corn and other garden plants. First appearing in New England, it spread through the Central and Western States and into Ontario. The United States Congress has frequently appropriated money to attempt to arrest its progress. To eradicate it is declared almost a hopeless task, for the corn borer attacks many different kinds of plants, the total destruction of which would turn the infested area into a desert. The method of control is to destroy

all cornstalks, either by using them as ensilage or by burning them during the winter.

Boys' Corn Clubs. The corn-club movement among American boys was definitely organized in 1909, and within a few years it had enlisted the active interest of over 90,000 boys. Each boy who enrolls is pledged to grow at least one acre of corn, and in caring for this plot he puts into application the most recent principles in regard to plowing, seed selection, spacing, cultivation, fertilization and the keeping of accurate accounts. Demonstration workers, county school superintendents and teachers supervise the work, and the boys are further aided by circulars and bulletins sent out by the United States Department of Agriculture. Prizes are offered for excellent work, the rewards being based on yield per acre, profits, quality of yield and written accounts of work done. The prizes include trips to fairs, corn shows and educational institutions, and animals, farm implements, books, scholarships in agricultural institutions, etc. See **Boys' and Girls' 4-H Clubs**.

The importance of these clubs lies not only in their educational and disciplinary value, but in the practical benefits resulting from up-to-date farming. Yields of 100 bushels to the acre are common; one boy reported a yield of 229 bushels on a Southern farm. It is an encouraging fact that the better-farming movement receives added impetus wherever corn clubs are maintained.

Essays on Corn

Practical Essay Work. The reason that composition work is often so unsatisfactory, and that pupils consider it the worst kind of drudgery, is because they are assigned themes which they do not understand and upon which they can obtain little or no information. The exhaustive treatment of school subjects in these volumes makes it an invaluable aid to the teacher who wishes to make her work interesting and successful.

Below are given a few essays on corn, prepared after a study of articles and illustrations pertaining to this subject. These essays are given to show teachers how the subjects presented in this work can be used to advantage, and as illustrations of what may be done in other subjects.

The illustrations are simple and such as any pupil will delight in drawing. If, however, the teacher feels unable to supervise work of this kind, very interesting illustrations can be found in catalogues of farm implements and articles in agricultural journals and other periodicals. These can be cut out and pasted on the pages of the essay.

On this and the eight pages following we have endeavored to present these essays in form not more artistic than the work of the average boy and girl can be made. If the student sees that he can write and draw as well as the writing and the illustrations shown herewith, it is a matter of encouragement to him.

By way of special emphasis we would like to state that in a great number of instances the boys and girls are easily discouraged in their attempts at drawing because their efforts fall immeasurably short of the perfection seen in the copy. It is true that a perfect copy leaves no room for doubt as to exact form and detail but for all practical purposes of these essays there is much encouragement lent to the exercise if the students can see in the copy from which they work that which has actually been produced by boys and girls with no better preparation than their own. It is therefore with pleasure that we offer such results in the following pages as may be achieved by every average pupil in any school in sections where corn is grown.



Description of the Corn Plant

Carolyn Ives

Corn is a sort of grass, that is, like wheat, barley, rye and oats, it belongs to the grass family. It is raised in almost every country having a warm or temperate climate.

The plant grows from four to twelve feet high, according to the variety. The stalks are jointed, dark green and purple in color, and are concave on one side. The leaves appear at the joints and partially enclose the stalk where they seem to grow from it. They are long, slender and pointed and when fully grown bend over so as to give the plant a very graceful and beautiful appearance.

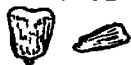


Corn has two kinds of flowers; those growing at the top of the stalk and forming the tassel, and those found in the ears. The first kind is called staminate flowers because they bear only stamens. The second kind consist of the silk and constitute the pistillate flowers, because the silk is nothing more nor less than a cluster of pistils, each of which ends in a kernel of corn on the ear.

The ears appear in the axils of the leaves at the joints. They are covered with a kind of leaf called husks. As the corn begins to ripen, the husks open at the top, showing the yellow kernels beneath, and the larger ears because of their weight, bend over so that by the time they are fully ripe they hang downward. The ears begin to form at the lower joints on the stalk, and the lowest ears are the oldest and the highest the youngest.

The roots extend far into the ground for the purpose of obtaining moisture and food from the soil. Could a corn plant be removed from the earth so as to have all of its roots joined to it, their number and length would surprise us.

When growing, the corn plant is of a deep green color with a brownish or purplish tassel at the top, and stalks that are purple on one side. The early frosts tend to turn the tips of the leaves and some of the husks a yellowish-brown; this color deepens and increases in extent as the corn becomes ripe. At any season of the year a field of corn is a beautiful sight.



Preparation of The Ground.

Mary Martin

The farmer who looks forward to a good crop of corn uses great care in preparing the ground. The soil must be made mellow and fine so that the roots of the corn can penetrate it and absorb nourishment.



The ground is first plowed to a depth of seven or eight inches. On small farms, where but little corn is raised, the old-fashioned plow, turning but one furrow, is used, but on the large farms in the corn belt, gang plows turning two, three and sometimes more furrows are employed.



On ground that has previously been plowed, a gang plow turning three furrows is easily driven by four horses, and can be operated with three horses. The driver rides, and controls the team and plow from his seat. Some very large gang plows are hauled by steam engines.

After plowing, the ground is harrowed. If the ground is old and mellow, only a toothed harrow is needed, but on new ground and ground where the soil is hard and lumpy, the disk harrow is used first and is followed by the common harrow. The harrowing is continued until the soil is made smooth for planting.



Planting and Cultivating Corn.

Mary H. Everts

On the small farms in New England and other Eastern States, much of the work is done by hand labor. On the

large farms in the corn belt, however nearly all of this work is done by machinery. The corn planter generally

used has two wheels and two sharp runners. These runners make a small furrow, into which the seed is dropped from boxes connected with a device known as a checkerboard. These machines are drawn by horses, and the best of them plant four rows at once, and with a good team, a machine will seed about ten acres in a day. For the large dent corn, the rows are four feet apart each way. This gives each hill of corn 16 square feet of ground. Sometimes another kind of planter is used, in which discs take the place of runners, as shown in the picture. In both kinds of planters, the wheels press the soil over the corn in the furrow.

Soon after the corn comes up, cultivating or plowing as it is usually



called, begins, and continues every few days until the corn is so large that further cultivation is liable to injure the plants by breaking the stalks and disturbing the roots. The corn is then laid by until the harvest.



A cultivator is used in plowing corn. It destroys the weeds, and stirs the soil. The cultivator has two wheels supporting a framework, to which beams bearing hoe shaped teeth are attached. The cultivator is drawn by horses and guided by two handles which extend back from the frame. One or two rows are plowed at a time. After the field is plowed one way it is usually plowed the other way so that the second plowing crosses the first.

The old way of cultivating corn was far different. A cultivator was used to plow between the rows one way; then this left a good part of the work to be done with the hoe. The work was slow and tiresome. If two men hoed an acre of corn in a day they called it a good day's work. Later a small cultivator was used, and this removed the weeds between the rows. This method is still used in regions where only small fields of corn are planted.

Harvesting Corn

Thomas Martin

Until within a few years, corn was harvested and husked entirely by hand. The ears were broken off, and the stalks left standing and were considered worthless. Now, by the use of the corn

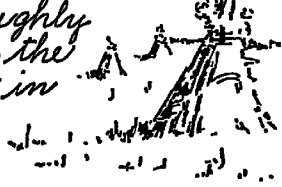


harvester, the corn is cut and the stalks are pushed under a binding frame, bound and raised on a platform from which the shock is set upon the ground.

The corn harvester is similar to the reaping machine, but it works with a slower motion.

Husking or shredding follows cutting and binding. The shocks are hauled to the farmyard, and the stalks are run through the shredder. This machine breaks the ears from the stalk and removes the husks, dropping them in one place and the clean ears in another.

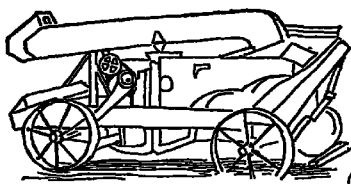
The part of the machine which does this work so neatly is made up of a frame which has from two to six steel rollers, containing flanges, and so geared that the rollers in each pair turn towards each other. The rollers are about four feet long, and the frame has one end lower than the other, so that the ears, as they are husked, can slide down the incline and drop out. Some shredders have a sheller attached to them, but in order to have this work successfully, the corn must be thoroughly dried before shredding. Usually the farmer prefers to store the corn in the ear in cribs until it is thoroughly dry.



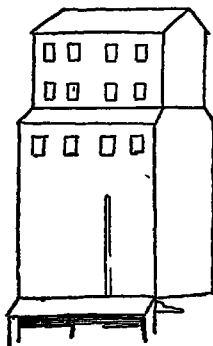
Marketing the Corn Crop

Arthur Clark

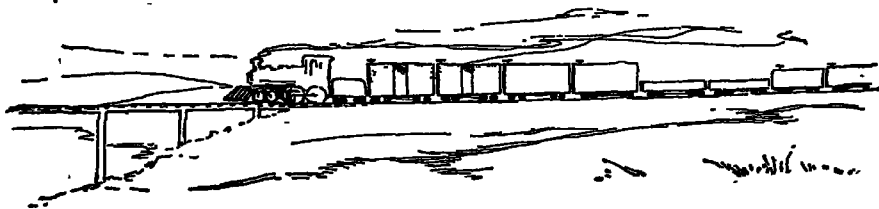
After the corn is husked, it is stored in long, narrow buildings called cribs. The sides of the cribs are made of narrow boards nailed to uprights so as to leave a space about an inch wide between the boards. This allows the air to circulate through the crib and dry the corn.



After the corn is dry, it is shelled by a sheller operated by steam or horse power. The corn is then hauled in wagons to the nearest elevator, from which it is loaded into cars and shipped to large cities. From these centers it is distributed to the mills and manufactories which make the various corn products.



Poor roads are a great hindrance in marketing the corn, and every movement to secure better country roads, and to reduce freight rates is a movement towards giving the farmer greater profits on his crop.



Outline on Corn

I. GENERAL DESCRIPTION

- (a) Stalk
 - (1) Height
 - (2) Jointed
 - (3) Color
 - (4) Structure
- (b) Leaves
 - (1) Shape
 - (2) Length
 - (3) Position
- (c) Flowers
 - (1) Silk
 - (2) Tassel
 - (3) Location on stalk
 - (4) Location on ear
- (d) Fruit—Ears
 - (1) Arrangement of kernels
 - (2) Covering
 - (3) Location on stalk

- (1) For mankind
 - (a) Meal
 - (b) Hominy
 - (c) Hulled corn
- (2) For animals
- (b) Miscellaneous uses
 - (1) Starch
 - (2) Glucose
 - (3) Alcoholic liquors
- (c) By-products
 - (1) Cobs
 - (a) Syrup manufacture
 - (b) For fuel
 - (2) Husks and stalks

Questions on Corn

Why called Indian corn?

How many dishes are made from corn meal in your home?

Start with the farmer and name some of the industries that arise from or are dependent upon corn.

To what family of plants does corn belong?

How does corn rank as a food throughout the world?

What does corn contain that makes it valuable as a food?

How many kinds of flowers has the plant? Which flower forms the tassel? Which the silk? What is at the inner end of each thread of silk?

Do the ears have an odd or even number of rows? How are they covered? Why?

Of what continent is corn a native? What is known of its use among the Aztecs and Incas? How far north is corn now cultivated?

How does corn compare in value with wheat?

What are the results of a failure in the corn crops of the United States?

How is corn planted? Cultivated? Harvested? When does the cultivation begin? Upon what do the methods of harvesting depend? What machines are now in use on the larger corn farms?

What proportion of the world's people use it as food? Give three forms in which it is commonly used.

II. HISTORY

- (a) Where first cultivated
- (b) When first used by white men
- (c) How introduced to all nations

III. KINDS

- (a) Flint corn
- (b) Dent corn
- (c) Sweet corn
- (d) Pop corn

IV. PLANTING

- (a) How soil is prepared
- (b) Machinery used in planting
- (c) When planted

V. CULTIVATION

- (a) Care of corn field
- (b) Extent of care required

VI. HARVESTING

- (a) Time of harvest
- (b) Method of harvesting
- (c) Where gathered corn is stored

VII. WHERE CULTIVATED

- (a) United States
 - (1) What portion of world's crop?
 - (2) Importance of crop
 - (a) Annual yield
- (b) Canada
 - (1) Extent of crop
- (c) Other countries

VIII. USES

- (a) As food

CORNEA, *kor'ne ah*. See **EYE**.

CORNEILLE, *kor na'y'*, **PIERRE** (1606-1684), one of the greatest of French dramatists. Previous to 1636 he had published various comedies and tragedies, which, while they were far superior to the dramas then on the stage, had not established his claim to a high rank. But in 1636 appeared his famous *Cid*, and at once he was recognized as the greatest dramatist which France had thus far produced. After the *Cid*, *Horace*, *Cinna* and *Polyeucte* appeared in rapid succession, works which show Corneille's genius at its best. The works which followed added little to his fame. Corneille observed in his tragedies the three unities of the Greeks, making his action take place within twenty-four hours and within one town, and relating every incident to a central plot.

CORNE'LIAN. See **CARNELIAN**.

CORNELL, *kawr nel'*, **UNIVERSITY**, an institution established at Ithaca, N. Y. in 1868. Its income has been derived chiefly from lands granted by the Federal government and from private gifts, notably those of Ezra Cornell (see below), \$500,000, the General Education Board, \$7,500,000, Henry W. Sage, \$1,175,000, Oliver H. Payne, \$500,000, George F. Baker, \$350,000, former students, \$1,500,000.

Ezra Cornell and Andrew D. White were members of the state legislature and secured the action that placed the land grant funds at the disposal of the university. Mr. White was chosen as the first president.

The university maintains the colleges of arts and sciences, architecture, engineering, agriculture, home economics, medicine, veterinary medicine; the school of law, the graduate school, the graduate school of education and the summer session.

The institution occupies a beautiful campus of 350 acres at the head of Cayuga Lake. Nine buildings are devoted to engineering, about twenty to agriculture, one to home economics, and others to the other colleges.

The general library contains about 900,000 volumes. Departmental libraries are maintained in the several schools and colleges. There are many valuable collections in these libraries, such as those on history, Dante, Petrarch, Iceland, philology, architecture, Spinoza, slavery, Germanic literature, Slavic history, China, the American Civil War, hydraulic and sanitary engineering, law reports, and veterinary medicine.

Ezra Cornell (1807-1874), founder of the institution, was born in New York state. He had very little education and began his career as a mechanic. His first work was in connection with the construction of telegraph lines, and the system of stringing wires on poles originated from his suggestion. After this he began to organize telegraph companies and gave much of his time to the construction of lines, as a result of which he amassed a large fortune.

COR'NET, a wind instrument of brass, with a cup-shaped mouthpiece, resembling the bugle in construction, but differing from it in the possession of three keys, or pistons, which can be pressed down by the fingers, giving a wide range of tones. It has a very agreeable tone and is a leading instrument in nearly every band and orchestra.

CORNFLOWER, a flowering plant of the composite family, also called *bachelor's button* and *kaiser-blume*. It is a weed in Central Europe, where it grows profusely, but is a popular garden plant in America. The flowers are borne on slender, branching stems, which grow from a foot to two and one-half feet high. The flowers are made up of rows of tubular florets, the outer ones being the larger and more showy. In color they are typically a beautiful blue, but they appear in various other shades.

CORNING, N. Y., the county seat of Steuben County, ten miles northwest of Elmira, on the Chemung River and on the New York Central, the Erie and the Delaware, Lackawanna & Western railroads. The city manufactures glass, terra cotta goods, brick, lumber, railroad supplies and pneumatic tools. The important buildings include the city hall and Corning Free Academy. Corning was incorporated as a village in 1849 and became a city in 1890. Population, 1930, 15,777.

CORN LAWS, a name commonly given to certain statutes passed by the Parliament of Great Britain to regulate trade in grains. The name *corn* in England refers to any grain, not especially to maize, or Indian corn, as in America.

The first form of interference by legislative enactment with the trade in England, beginning soon after the Norman conquest, was the prohibition of exportation, an expedient used in those times to prevent scarcity in a sudden emergency. The policy was continued, with slight changes, till the time of Charles II, when import duties, upon a slid-

ing scale, were for the first time introduced. These remained in force till 1846, when Sir Robert Peel, influenced by a popular agitation, and more especially by the Anti-Corn-Law League, headed by Cobden and Bright, carried a measure repealing the duty on imported grain, except a nominal sum of one shilling per quarter. This also in 1869 was done away with, thus leaving the importation entirely free.

CORNS, small growths of the skin caused by pressure or friction. They are found most frequently on the toes, and in this case are the result of wearing shoes that are too tight. There are two kinds that are very common—fibrous, cone-shaped corns and soft corns. The former occur on top of the toes. They are pressed downward by the shoe into the flesh and are very painful unless the top growth is kept pared off. Soft corns generally appear between the toes, a position that renders them very annoying. If neglected they may give rise to painful ulcerations. Wearing loose shoes with insoles of cork is recommended as a relief for corns. A well-known physician has said that to cure corns one must begin back in childhood, a process attainable only in theory. The lesson for parents is to have their children wear properly-fitting shoes, as well established corns are difficult to cure permanently. A standard remedy for removing the hard part of a corn is a solution of salicylic acid and collodion. Bad cases should have the attention of a reliable chiropodist.

CORNUCOPIA, *kawr nu ko' pi a*, a wreathed horn filled to overflowing with fruit, flowers and grain, used as the symbol of plenty. In art it is frequently represented as held by the Goddess of Plenty or some other symbolic figure. The horn of plenty is a familiar design in both heraldry and architecture.

CORNWALL, ONTARIO, the county town of Stormont County on the Saint Lawrence River, fifty-six miles southeast of Ottawa and sixty-eight miles southwest of Montreal. The Saint Lawrence at this point passes through the Long Sault Rapids, which steamers avoid by using the Cornwall canal, eleven miles long. The town is on the Canadian National and the Ottawa & New York railways. Cornwall has abundant electric and water power for its manufacturing industries, of which the chief products are furniture, cotton goods, pulp, paper and la-

crosse supplies. It also has iron foundries and a silk mill. The water and sewerage systems are owned by the municipality.

Population, 1926, 9,125, in 1931, 11,126.

CORNWALLIS, *korn wollis*, CHARLES, Marquis, of (1738-1806), a British soldier and statesman, whose surrender at Yorktown in 1781 virtually ended the Revolutionary War. On the outbreak of the struggle he sailed for America with his regiment, although he was opposed to the war. He took part in the Battle of Long Island and afterward pursued Washington through New Jersey; but a part of his army was captured at Trenton, and he himself was defeated at Princeton. The victory of the British at Brandywine was due largely to him, and he fought against General Gates at Camden and General Greene at Guilford. Six months later he was besieged in Yorktown and was compelled to surrender, October 19, 1781. In 1786 Lord Cornwallis went to India as commander in chief and Governor-General, invaded Mysore in 1791 and obliged Tippu Sahib to surrender much territory. On his return to England he was created a marquis and appointed lord-lieutenant of Ireland, and again in 1805 he became Governor-General of India.



LORD CORNWALLIS

COROLIA, in a typical flower the inner of the two sets of floral leaves. It is the part made up of the petals, and is the part that is usually beautifully colored. See FLOWERS.

CORONA, *ko ro' na*, a term used in astronomy, botany and architecture. It all of its uses it shows its derivation, for it comes from the Latin for *crown*. In astronomy a corona is a crown of light encircling the sun, which is visible briefly during total eclipses. In botany the term refers to an appendage between the corolla and stamens of flowers like the narcissus. In architecture the corona is the upper projecting portion of a cornice.

CORONADO, *ko ro nah' doh*, FRANCISCO VASQUEZ (about 1500-1549), a Spanish ex-

plorer whose name is connected with the search for fabled golden cities. In 1535 Coronado journeyed to Mexico, where he became a high official by marrying the daughter of the royal treasurer of New Spain. He arrived there in time to hear wonderful tales of seven rich cities reputed to have been discovered by a Spanish monk, and in 1540 he led a band of Spaniards and native Indians in search of these stores of wealth. The expedition discovered the Grand Canyon of the Colorado and went as far north as the boundary between Nebraska and Kansas, returning to Mexico in 1542.

CORONER, one of the most important civil officers in a county. It is his duty to investigate the cause of deaths when the cause is not attested by physicians or when death occurs under suspicious circumstances. When death results from a fire he may investigate any suspicious circumstances connected with the origin of the fire. He is assisted in his investigations by a *coroner's jury* of six men, who decide whether persons suspected of wrong-doing in connection with deaths shall be held for grand jury investigation or for trial. In most states the coroner acts as sheriff when there is a vacancy in that office.

CORONET, a special form of crown, which princes and nobles wear on ceremonial occasions. In England the rules concerning coronets are rigidly observed. That of the Prince of Wales has a single instead of a double arch, differing in this one particular from the royal crown; a ducal coronet bears on its rim eight strawberry leaves, and that of a marquis four strawberry leaves and four silver balls. There are other forms for an earl, viscount and baron. The coronet is used as a symbol of nobility in the following lines from Tennyson:

Kind hearts are more than coronets,
And simple faith than Norman blood.

COROT, *ko ro'*, JEAN BAPTISTE CAMILLE (1796-1875), a French artist, one of the most famous of the Barbizon school (see **BARBIZON PAINTERS**). Corot painted large sacred pictures, such as the *Flight into Egypt* and the *Baptism of Christ*; but his most characteristic and successful work was in landscape. His woodland scenes, painted for the most part at dawn or twilight, in a scheme of pale greens and silvery grays, show a singularly subtle feeling for this phase of nature, and are undoubtedly among the most important

contributions of the century to landscape art. Among his works are *Dance of the Nymphs*, *View of Narni* and *Bath of Diana*. There are excellent examples of his work in the Metropolitan Museum and in the Chicago Art Institute.

CORPORAL, *haw' po ral*, the lowest non-commissioned officer in an army, ranking below the sergeant. He is in charge of a squad comprising seven men, and his duties consist largely in placing and relieving sentinels and in leading his squad in assigned details. He is appointed by the higher command in his company.

CORPORAL PUNISHMENT, the infliction of bodily pain as a mode of punishment. The term is used most commonly with reference to the discipline of children. (The reader will find a discussion of corporal punishment in regard to home training in the article **CHILD TRAINING**.) For many centuries the belief that the rod has an indispensable place in the school was firmly held, but since the middle of the nineteenth century the evils of corporal punishment have been generally recognized, and to-day in large cities whipping in the schools has been practically abolished, though it still prevails in some rural sections. In many states and provinces corporal punishment in schools is forbidden by law. The modern theory is that whipping tends to antagonize the child and to rouse his lower instincts, and that no real reformation can result when fear alone is stimulated. Furthermore, it is felt that a child should be whipped only by its parents, if at all, and that the liberty to punish by inflicting pain may lead to serious results when administered by an unscrupulous or quick-tempered teacher.

CORPORATION, a company of persons organized under forms prescribed by law to conduct a business enterprise. The law treats it as a single individual, which it really is. The owners are called *shareholders*, or *stockholders*, by virtue of investment of money in the enterprise, but they have no part in the actual management of the business except such influence as they can wield when they meet annually to elect men from their membership to direct its affairs. These men so chosen are called *directors*, and from their number the *officers* to conduct the day-by-day operations are chosen.

A corporation may own land, but the individual members of the corporation have no

rights therein. A corporation may owe money, but the members as individuals are under no obligation to pay the debt. If, however, an individual has not paid up his stock in full, he is liable for the amount unpaid. The corporation is not dissolved by the death or withdrawal of members, or the substitution of other members, stock, or shares, merely pass from one ownership to another. This capacity of perpetual succession is regarded as the distinguishing feature of corporations, as compared with other societies.

A corporation is formed by legislative act, more and more generally in accordance with standard laws, providing a certain set of steps for incorporation.

Classes of Corporations. Corporations are divided into two main classes, public and private. *Public* corporations are those created for government purposes, such as corporations of states, counties, cities, villages, or incorporated official boards of officers, as a park board. Of *private* corporations, there are four classes:

- 1 Corporations for the pecuniary profit of individual members. The basis is a capital fund engaged in commercial enterprise. Shares of stock are held by stockholders. Such corporations are regulated in the United States by statutes, which designate the relations and privileges of the corporation. Such corporations are organized and chartered for specific purposes and cannot transact business other than that for which they are organized. Examples are railroads, telegraph and telephone companies, insurance and banking corporations. The profits are divided pro rata among the stockholders.

- 2 A corporation not organized for profit. In such a corporation there is no stock and no capital. Examples are social, artistic, scientific, religious and professional societies.

- 3 Corporations for mutual aid and relief. The first object is the element of personal membership and benefit, the division of profit is a secondary consideration. Examples are building and loan associations, coöperative societies and lodges of various kinds. Such corporations are generally under state control.

- 4 Incorporated trusts. Such corporations have a fund set apart for some special purpose, held usually by a board of trustees. Examples are colleges, hospitals and charitable associations.

Why Corporations Exist. Partnerships are formed that two or more men may combine their capital and services in a small business; corporations are partnerships on a large scale. There may be hundreds of partners in a corporation, or even thousands;

they are not known as partners, but as *stock holders*. Great enterprises are possible because many people join in providing very large capital. More safeguards must be thrown around investors in incorporations than in partnerships, because individual members cannot participate in the handling of its affairs. A corporation is beneficial if it does not grow so strong and powerful that it is able to control the commodity in which it deals; if it becomes monopolistic it may become an evil. This feature of corporations is described in the article *TRUSTS*.

CORPORATIONS, BUREAU OF. See *FEDERAL TRADE COMMISSION*.

CORPUS CHRISTI, TEX., the county seat of Nueces County, is situated on Corpus Christi Bay, at the mouth of the Nueces River, 200 miles southwest of Galveston, on the Southern Pacific, Missouri Pacific, and Texas-Mexican railroads. The city has cotton compresses and cottonseed oil mills, and manufactures caustic soda, basic alkali, concrete pipe and tile. There is a municipal airport and Corpus Christi College, and the harbor is adequate. Population, 1930, 27,741.

CORREGGIO, *kor red'jo* (1494-1534), the popular name of ANTONIO ALLEGRI, a famous Italian painter, born at Correggio, near Modena. Correggio is unrivaled in his handling of light and shade, in the grace and rounding of his figures and in the beauty of their expression. Among his best pictures are *Night*, *Saint Jerome*, *Marriage of Saint Catharine*, the *Penitent Magdalene*, the altar pieces of *Saint Francis*, *Saint George*, *Saint Sebastian*, and several madonnas. See *PAINTING*.

CORRELATION, in pedagogy, the natural relation which different subjects of learning bear to one another. The principle of correlation was recognized by Pestalozzi, Froebel and Herbart, each of whom regarded it as an important law in education. For a time correlation was greatly neglected by educators, but it has recently been recognized again and given a prominent place in all systems of primary and secondary instruction. Correlation considers the relation of each subject to other subjects; as the relation of geography to nature study, history to geography, etc.

CORRESPONDENCE SCHOOLS. See *SCHOOLS, CORRESPONDENCE*.

CORROSIVE SUBLIMATE, *ko ro'siv sub'li mate*, or bichloride of mercury, is a

white crystalline solid, a burning poison of great strength and a powerful antiseptic. It is a compound of chlorine and mercury, is soluble in water, and is used to disinfect wounds. Taxidermists also find it useful to protect skins from insect attacks. For remedies in case of poisoning from this chemical, see *ANTIDOTE*.

CORRUPT PRACTICE ACTS, laws designed to deal with offenses committed in connection with elections to public office. These acts provide for punishment for bribery, treating to intoxicating liquors, exercising improper influence over voters, impersonation of legal voters, swearing to false election returns or incurring too large expenditures.

CORSET, an undergarment worn by women for hundreds of years, varying in style and material with changing vogues, but designed at all periods for the purpose of giving trimness to the figure and support to the body. In the days of our grandparents, a corset was fashioned in two parts, fastened together with hooks at the front and lacing at the back. To preserve a rigid form, it was reinforced with numerous narrow strips of whalebone or steel sewed lengthwise into the fabric. When it was the fashion to appear with slender waists, the corset usually was not only uncomfortable but often a menace to health, for it pressed the organs of the body out of the positions designed by nature, a matter to which medical science repeatedly called attention. Today the old-time corset is worn by a few women who reject new modes, but for them the unyielding parts may be replaced by elastic webbing. The modern successor to the corset is a sampler, yielding garment called a corset-lette.

CORSICA, *kaw'si kah*, an island in the Mediterranean Sea, 100 miles south of France, famous as the birthplace of Napoleon. It is a possession of France, and is the fourth in size of the islands of the Mediterranean. Corsica is about 110 miles long and fifty-nine miles wide, and has an area of 3,367 square miles. There are fine forests, containing pine, oak, beech, chestnut and cork trees, and the mountain scenery is splendid. In the plains and numerous valleys the soil is generally fertile, but agriculture is in a backward state. The Corsicans, who number about 300,000, are not a progressive people, and much of their farm work is done

by laborers from Italy. The chief exports are wine, brandy, olive oil, chestnuts, fruit and fish. The chief towns, Ajaccio, the capital, and Bastia, are connected by railway.

Corsica was first colonized by the Phoenicians, from whom it received the name of Cynnos. The Romans afterward gave it that of Corsica. From the Romans it passed to the Goths, from them to the Saracens, and in the fifteenth century, to the Genoese, who ceded it to France in 1768. The British gained control of it in 1794, but were obliged to yield it again to France in 1796. Population, 1931, 293,752.

Ajaccio, the capital, is famed as the home of the Bonaparte family. The house in which Napoleon was born is kept as a permanent memorial by the French government. The town is also noted for its coral and sardine fisheries. Population, about 23,000.

CORSICANA, *kor se kah'nah*, Tex., the county seat of Navarro County, 163 miles northeast of Austin, on the Saint Louis Southwestern, the Southern Pacific, and Fort Worth & Denver City railroads. There is an airport. There are many oil wells in the vicinity, and the city is a manufacturing center. It has cottonseed oil mills, brick-yards, flour mills, grain elevators and manufacturing of cotton presses and cotton gins. The state asylum for orphans is here. Population, 1920, 11,356; in 1930, 15,202.

CORTES, *kawr'tes*, the name for the law-making body of Spain. See *SPAIN*, subhead *Government*.

CORTEZ, *kawr'tays*, **HERNANDO** (1485-1547), one of the greatest of adventurers from Europe to America in the period immediately following the discovery of the New World. Cortez's great exploit was the conquest of Mexico; it was inspired by the characteristic Spanish hope of finding gold and treasure.

This intrepid man was born at Medellin, **HERNANDO CORTEZ** Spain. He went to the West Indies in 1504, and in 1518 he set out from Santiago de Cuba with eleven vessels, about 700 Spaniards, eighteen horses and ten small field pieces. He landed on the shore of the Gulf of Mexico, where he caused



his vessels to be burned, in order that his soldiers might have no other resources than their own valor. After meeting stubborn resistance from several tribes near the coast, he was able to go on his way toward the Aztec capital Montezuma, the great Aztec ruler, received him in a friendly spirit and housed the Spanish leader hospitably. Cortez learned of a conspiracy against him and by trickery secured Montezuma as a hostage. The Aztec king died, and the Spaniards were driven from the city with great loss. It was not until the middle of 1521 that Cortez was able to re-enter the city, for the Aztecs fought stubbornly against him. (See *MONTESUMA; AZTEC*) In 1528 Cortez returned to Spain, but two years later he was again sent out to Mexico, where he remained for ten years.

CORUNDUM, *ko run'dum*, a compound of aluminum and oxygen, in hardness next to the diamond. There are several varieties, ranging from the transparent colored forms, the amethyst, ruby, sapphire, etc., to a coarse variety known as emery (which see). The colored varieties are found chiefly in Burma, Ceylon and China, and the name is derived from the Hindu word *kurand*. Corundum is four times heavier than water.

COEYZA, the medical name for the common cold. See *COLD, COMMON*.

COSMETICS, *kos met'iks*, a general term for a variety of liquids, creams, pastes and powders used to beautify or rejuvenate one's appearance. They include tonics, bleaches and dyes for the hair, massage, cleansing and vanishing creams for the skin, powders and rouge, and preparations for the removal of superfluous hair. Most of the preparations found on the market are harmless, but a good many are fraudulent. Special care should be taken in the selection of dyes for the hair, as many cases of poisoning have resulted from their use. Health specialists maintain that sensible living and cleanliness are preferable to cosmetics as beautifiers, but manufacturers of these preparations continue to prosper.

COSMIC RAYS. The word *cosmic* relates to the universe, and signifies something universal. Cosmic rays are electromagnetic radiations released in outer space at unknown but tremendously far distances from the earth as a result of creation of matter in what may be new stellar universes in process of formation. They are the most powerful of all known electromagnetic radiations,

with the greatest penetrating power, shortest wave-length and highest frequencies. They possess a frequency per second estimated at 100 billion billion, infinitely beyond the profoundest comprehension of the mind of man, their wave-length is believed to be about five-trillionths of a centimeter (a centimeter is one-hundredth of 39 $\frac{3}{8}$ inches), they are powerful enough to penetrate eighteen feet of lead, more than twenty times as far as the penetrating power of gamma rays, the most powerful rays of radioactive energy.

Cosmic rays beat upon the earth from all directions in a ceaseless bombardment. From what is so far known of them the most important fact seems to be that they offer proof of a continuously building up of the universe. Their discovery is due to studies by Dr. R. A. Millikan, the renowned physicist of the California Institute of Technology at Pasadena.

COSMOS, *kos'mos*, a group of flowering plants found in Mexico, a few species of which are now grown in the United States and Canada. One of the popular forms is bushlike, sometimes reaching a height of ten feet. It blooms in the fall, sometimes as late as November, and bears pink, white or crimson flowers, with yellow centers. Another species, blossoming in late spring in the Southern states, bears flowers of a rich orange-yellow or sulphur color. It grows to a height of four feet or less. It thrives in a sandy soil not too rich. It may be transplanted into gardens from indoor seed boxes.

COS'SACKS, a class of people who were regarded as a distinct military division of the Russian population under the czars. They lived in the southern and eastern portions of European Russia, and held their lands by military tenure, being liable to service for life. Writers are not agreed as to the origin of this people and of their name, but they seemed to differ from the Russians more in their manner of life than in blood and lineage. Originally their government formed a kind of democracy, at the head of which was a chief, or hetman, of their own choice. That democracy gradually disappeared under Russian domination.

In the World War the Cossacks maintained all the traditions of their past, but the conflict marked their doom. When the Soviet government seized power, the Cossacks fought its armies unsuccessfully, their

strength waned, and their prestige was lost. The once powerful community was given no consideration in the violent social upheaval, it had been a Cossack boast that for centuries they had been the proudest and most valiant soldiers of the czar, but this distinction was now wiped out, and they suffered the leveling that was the fate of the peasantry of all Russia.

COSTA RICA, *ko'sta re'ka*, the southernmost republic of the Central American states, excepting Panama, which is now classed as a division of Central America and itself a republic. The area is 23,000 square miles, nearly that of West Virginia. The population in 1934 was 551,500. Spanish is the language of the country (see **DEMARCATION**, **LINE OF**); the religion is Roman Catholic, but there is absolute liberty in religious matters.

The country is rich in agricultural resources, though traversed by a mountain range which is a link in the system extending through both American continents. There are three climatic regions, due to the mountains. Below 3,000 feet elevation is a hot zone; from 3,000 feet to 7,000 feet is a temperate climate, and above 7,000 feet is a decidedly cool region. On the whole, Costa Rica is healthful. The agricultural products, in order of importance, are coffee, bananas, cacao, sugar cane, rice, potatoes and tobacco. Gold and silver are mined in constantly increasing quantities. The distilling of liquor has been for years a government monopoly.

There are 6,500 factories, consuming the products of the country, 415 miles of railroad, 205 telegraph offices and 211 post-offices.

Costa Rica was discovered by Columbus in 1502, and was first colonized in 1532 by the Spaniards. Until 1821 it was part of the Spanish province of Guatemala. After unsuccessful attempts to form a Central American Federation, and other vicissitudes, it became independent in 1848, and formed a constitutional government, which has been amended several times. By the election law of 1913 universal manhood suffrage was adopted. The President of the republic is elected for four years. The law-making power is vested in the Constitutional Congress, of one house, made up of forty-three members. The capital city is San José (which see). **CENTRAL AMERICA**.

COTES, SARA JEANNETTE (1862-), a Canadian author, born in Brantford, Ontario, and educated at the Collegiate Institute there. Her maiden name was **SARA JEANNETTE DUNCAN**. She began her career as a school teacher, but gave that up for journalism. Her first series of letters were descriptive of the Cotton Centennial Exposition, New Orleans. Afterwards she became a member of the editorial staff of the *Washington Post*, and later returned to the *Toronto Globe*, where she wrote under the pen name of "Garth Grafton." She made a tour of the world, writing letters for a syndicate of American and Canadian newspapers. Some of her best known works are *A Social Departure*, *How Orthodoxy and I Went Round the World by Ourselves*, *The American Girl in London*, *A Daughter of To-day*, *Vernon's Aunt*, *The Simple Adventure of Mem Sahib*, *The Story of Sonny Sahib*, *His Honor and a Lady*, *Those Delightful Americans*, *The Pool in the Desert*, *The Imperialist*, *Burnt Offerings*, *The Consort* and *Cinderella of Canada*.

COTOPAXI, *ko toh pak'se*, the most remarkable volcanic mountain of the Andes, in Ecuador, about sixty miles northeast of Mount Chimborazo. Its altitude has been estimated at 19,613 feet. It is the most beautiful of the great summits of the Andes, and is almost a perfect cone in shape. Several eruptions have occurred.



COTTON, a plant of the mallow family, whose fibers provide the civilized world with a large portion of its clothing, and whose products are utilized in countless ways for the comfort and happiness of mankind. Cotton would seem to have been especially created by Mother Nature for the welfare of the human race, and a world without it would lack the commonest necessities of life. This fact has been stated in a series of familiar pictures by Frank G.

Carpenter, in his interesting volume *How the World Is Clothed*:

"There is no other plant that comes so close to civilized man, and none which we use so



COTTON

1. Shipping Cotton
2. Blossom

4. Cotton Plant
5. Cotton Oil

6. Cotton Fiber
7. Boll Open

9. Cottolene
10. Spinning Frame

11. Loom
12. Gin and Press



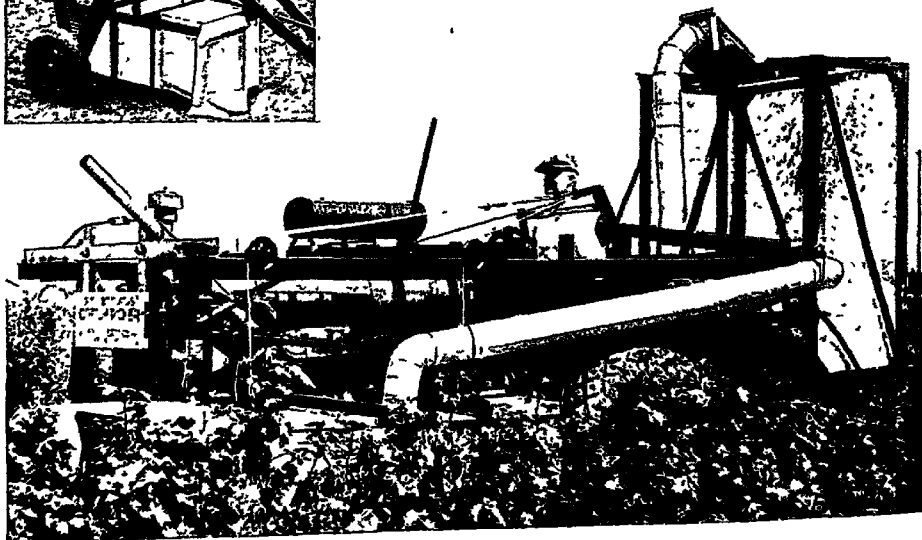
THE OLD ORDER IS PASSING

The traditional method of cotton-picking throughout the cotton belt will gradually give way to the machine age. Below are views of the first successful mechanical picker, the invention of Rust Brothers, perfected after twenty years of labor.



Keystone

Ewing Galloway



much every day of our lives. We go to sleep between cotton sheets, resting our heads on feathers inclosed in cotton pillow slips. We step out in the morning upon a cotton rug, pull cotton stockings over our feet, and dress our bodies in garments made largely of cotton. If, in our hurry, we burst off a button, we sew it on with cotton thread, and then, having put on our shoes, tie them tight with cotton strings. We may wash our faces with soap made from the oil of the cottonseed, and dry them with a cotton towel. And so it goes on throughout the day. We have cotton before us in one shape or another almost every hour until, when tired out, we seek our rest; and then it is this cool white fiber that soothes our fatigue and gives us pleasant dreams."

Not only is man dependent on the plant for much of his comfort and happiness, but he finds that cotton is absolutely indispensable to him when he goes to war. The fate of every army in the World War was bound up in the cotton supply. Gun-cotton (which see), one of the most important explosives, is made from cotton wool, and numerous chemicals are produced from cotton pulp. Thousands of tons of cotton are used in the manufacture of rubber tires, tubing, percussion shields, etc., and miles of fiber go into the making of bandages, stretchers and hospital bedding. Cotton forms an indispensable part of the equipment of armies and navies, and even the waste is used in cleaning firearms and big guns. See COTTON-SEED PRODUCTS.

Distribution and Varieties. The cotton plant originally grew in the tropics, but cultivation has extended its range to about the thirty-fifth parallel on each side of the equator, with the most productive regions lying between 20° and 35° north latitude. In this section are produced the cotton crops of the United States, Northern India and Egypt, and these three countries together produce about nine-tenths of the world's supply.

Of the several varieties cultivated for the market four stand out prominently. They are the *sea-island*, the *Egyptian*, the *Peruvian* and the *upland*. The first named has the longest, finest and silkiest fibres, with an average length of 1.61 inches. The stalk of this variety reaches a height of twelve feet or more. The plant can be grown only upon low lands, and takes its name from the fact that it was first raised on islands off the coast of South Carolina, Florida and Georgia. Egyptian cotton, which is a variety of sea-island, is imported into the United

States in considerable quantities, as it is especially suited to the manufacture of goods requiring a smooth finish and is less expensive than sea-island cotton. Peruvian cotton, also imported into the United States, possesses a rough, strong fiber, something like that of wool. It is well adapted to mixing with wool and is used in the manufacture of underwear and hosiery.

Upland cotton is the most widely used and the most abundant of all varieties. Its fibers are on the average slightly less than an inch in length, and the stalk reaches a height of from two to four feet. Because it is the most important variety cultivated in Southern United States, from which comes the bulk of the world's supply, it is described in some detail in the following paragraphs.

Cultivation and Harvesting. The cotton belt extends from Texas to North Carolina. After the land is well plowed, the usual method is to bed up the ground in rows from three to four feet wide. The seed is dropped in the center of these rows, five or six seeds at a time, either in narrow furrows or in holes about a foot apart. As more than one plant every twelve inches is not considered advisable, the plants are thinned out after two weeks' growth. Planting commences about March 1 in Southern Texas and continues to the end of May in the Piedmont region of North Carolina and other sections as far north.

Soon after the plants are above ground they put forth green leaves and peculiarly-shaped buds called *squares*, which blossom into delicate white flowers when the stalks are a foot or so in height. The sunlight soon turns the white of the blossoms to pink, and about the third day the flowers fall to the ground. They are succeeded on the stalks by tiny green bolls, the parts containing the cotton fiber. Bolls are susceptible to the attacks of the malignant boll weevil (which see), whose ravages cause great loss every year.

After six or eight weeks the ripened bolls burst open and are ready for picking. Since only a portion ripen at the same time, there must be several picking times for the field. Formerly the picking was all done by hand labor, but successful cotton-picking machines have been invented and are in use in large fields. They save considerable expense in harvesting the crop. When the cotton is picked it is sent to the gin house, where it

is ginned, or separated from the seeds. The fiber is then placed in presses and pressed into bales of 500 pounds each. These are bound with iron hoops, when they are ready for shipment.

Cotton Products. The most important of these are suggested in the opening paragraphs, and the processes by which the fiber is converted into cloth are described in the articles *SPINNING* and *WEAVING*. In addition there are numerous products derived from the seeds (see *COTTONSEED PRODUCTS*).

Cotton Statistics. The annual crop for the United States ranges between 10,000,000 and 15,000,000 bales of 500 pounds each. Texas is always first among the states in the annual crop, ranging from 2,750,000 to 4,307,000 bales; the last-named figure is that for its heaviest crop (1932). Second honors in production fluctuate greatly. Oklahoma, Arkansas, Mississippi, Alabama, or Georgia occupies second place from year to year. Besides these states, those that produce cotton in large quantity are Louisiana, North Carolina, South Carolina, and Tennessee. The yield in Florida averages not more than 25,000 bales. The entire cotton acreage varies from 28,000,000 to 42,000,000, but both acreage and crop decreased sharply under the cotton control law of 1933, which proved a temporary expedient.



BRITISH INDIA
3,600



TEXAS, 3,500



MISSISSIPPI
1,100



EGYPT
1,040



ARKANSAS
1,000



GEORGIA
900

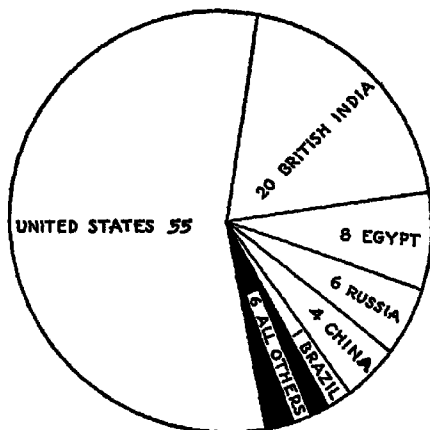
WHERE "COTTON IS KING"

Annual production is given in thousands of bales.

The relative importance of cotton countries and states is shown in the accompanying diagram. There are about 157,000,000 cotton-consuming spindles in the world, of which about 31,000,000 are in the United States. About two-thirds of these are in the cotton States, Massachusetts having yielded its former leadership in cotton manufacture.

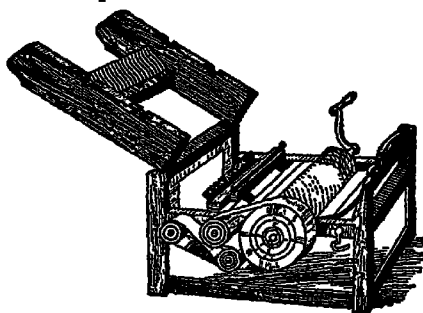
History. Cotton has been used since about the eighth century B. C. It was known to the Egyptians, the Greeks and the Romans, and

its cultivation was introduced into Europe by the Mohammedans during the Middle Ages. The European cotton is probably a native of India, but the plant is also native



PROPORTION OF WORLD'S SUPPLY OF COTTON CONTRIBUTED BY EACH COUNTRY

to America. When the American continents were discovered the inhabitants of Mexico and Peru had attained a good degree of skill in raising cotton and manufacturing it into cloth. The planting of cotton began in the Southern states soon after the settlement of the older colonies, but the expense of separating the fiber from the seed was so great that cotton was not a profitable crop. In the latter part of the seventeenth century the



FIRST COTTON GIN

invention of the power loom and the mule jenny for spinning so increased the facilities for manufacturing cotton goods that enough cotton could not be raised to supply the demands of English manufacturers. In 1793 the cotton gin was invented by Eli Whitney

Outline on Cotton

I. VARIETIES

- (1) Long fiber or sea island cotton
- (2) Short fiber or upland cotton

II. WHERE RAISED

- (1) United States
 - (a) Sections
- (2) Foreign Countries
 - (b) Names

III. PLANTING

- (1) Methods
- (2) Season

IV. CULTIVATION

- (1) Soil
- (2) Dry season, to mature
- (3) Temperature

V. HARVESTING

- (1) Time
- (2) How picked.
- (3) Sent to gin house

VI. SEAPORTS, RAW MATERIAL

- (1) United States
- (2) Foreign

VII. FACTORIES

- (1) United States
- (2) Foreign Countries

VIII. PRODUCTS

- (1) Cloth
- (2) Cottolene
- (3) Fodder and Fertilizer

IX. HISTORY AND GROWTH OF COTTON INDUSTRY

Questions on Cotton

When and how are cotton seeds sown? How is cotton cultivated?

How long after the flowering has commenced do the seeds open?

How is cotton harvested? How is it separated from the seeds?

How did the invention of the cotton gin affect the production of cotton? Who invented it?

What is the weight of a bale of cotton?

Which is the oldest cotton-growing country? Who introduced cotton into Europe?

Name the chief cotton-producing countries

Where and when was cotton first planted in the United States?

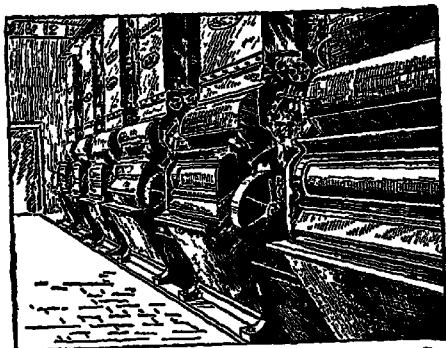
(see COTTON GIN; WHITNEY, ELI). This machine enabled one man to do more in separating the cotton from its seeds than a hundred men could accomplish by hand labor, and it revolutionized the cotton industry. The first exportation of cotton, consisting of eight bags, weighing 1,200 pounds, was from Virginia in 1784. In 1791 the United States furnished less than one-sixth of one per cent of the cotton importation of Great Britain, a century later its crop was sixty per cent of the world's supply. The increase was from 8,889 bales weighing two hundred twenty-five pounds each to 9,534,700 bales weighing 500 pounds each.

When Alexander Hamilton wrote his great "Report on Manufactures," in 1791, he referred to certain branches of the textile industry as already established; yet at that time there was but one cotton factory where spinning was carried on by water power, and that factory had been established less than a year and had only seventy-two spindles. Although some progress was made during the next twenty years, it was not until the War of 1812 cut off foreign supplies that the cotton manufacture was truly "established." During every decade, not even excepting that which included the Civil War, there has been an increase in the number of employes and in the quantity and value of the goods manufactured. The census of 1850 showed a total value of products of \$61,869,000. In 1860 the value had risen to \$115,681,000; in 1870 to \$177,489,000, but a large part of the increase was due to the inflation of the currency. In 1890 the value was \$267,981,000, in 1900, \$339,200,000, and in 1910, \$630,615,000, ten times the product of 1850, and by 1930 the value of cotton products had grown to over \$1,400,000,000. It was the first, the largest, and most typical factory industry in the country, and still retains a position not far from the top.

COTTON, JOHN (1585-1652), a Puritan clergyman and scholar, born at Derby, England. He was tutor at Cambridge, had a charge in Lincolnshire about 1612, and when summoned to appear before Laud in 1633 because of his Puritan views, he fled to Boston, New England, and preached there till his death. Cotton was the author of a catechism, forms of prayer and other works, and in a controversy with Roger Williams he defended the right of civil authority to interfere in religious matters.

COTTON-BOLL WEEVIL. See BOLL WEEVIL.

COTTON GIN, a machine for separating cotton fiber from its seeds. The name is a corruption of *cotton engine*. The cotton gin was invented by Eli Whitney in 1793, and because it made the cotton industry vastly more profitable and greatly extended it, it was directly responsible for the growth of negro slavery in America. The original machine consisted of a wooden cylinder, into which were fastened strong wire hooks resembling the teeth of a saw. The points of these hooks passed between vertical wires held by a frame, and as the cylinder revolved, the teeth drew the fiber between the wires and let the seed fall to the ground. The cylinder was afterwards replaced by saws operating on the same principle. A modern gin contains seventy saws and will clean 5,000 pounds of cotton in twelve hours. By diligent labor it was possible for one person to separate the seeds from one pound of fiber in a day by hand. See COTTON; WHITNEY, ELL.



BATTERY OF MODERN COTTON GINS
(For illustration of the first gin, see article Cotton.)

COTTONSEED PRODUCTS. The most important of the products derived from the seed of the cotton plant is a yellow oil. This is extracted by pressure after the seeds have been freed of fibers, burs of lint and hulls. The oil is employed in the manufacture of cottonlens, which is used for lard; it is also a substitute for olive oil, and has a place in the manufacture of soaps. About 290 pounds of crude oil may be extracted from one ton of cottonseed. The production of the oil is an important industry in Southern United States. The annual output of the entire country in recent years is over 4,000,000 tons.

Over 2,000,000 tons of cottonseed cake and meal are also produced annually in America. A hard, dry cake remains after the oil has been pressed from a mass of seeds, and when ground this cake forms cottonseed meal. It is an excellent stock food, and when mixed with acid phosphate it has value as a fertilizer. The hulls of the seeds are also used as stock food, and the fine pieces of lint (linters), which cling to the seeds in the ginning process, are used in the manufacture of low-priced yarns, upholstery, wadding, etc. Another by-product is sludge, which settles at the bottom of oil tanks. It is used in the manufacture of soap.

COTTONWOOD, a tall, quick-growing tree of the poplar family, so called because the seeds are borne in green balls which are filled with a white, cottony mass. In May these balls burst open, and their fluffy contents are widely scattered. The cottonwood is distributed through the Eastern and Central United States, especially along the banks of streams. In Canada it grows from Quebec to the North West Territories. The bark is gray-brown and rough, the leaves tapering and shiny, and the flowers are borne in catkins that fall in the spring. Cottonwood is not a strong wood, but is useful for making packing cases, barrels, woodenware and pulp. In cities the tree provides delightful shade, and may live to be seventy-five years old, but in exposed places in country districts the brittle wood cannot stand against the winds, and is short-lived.

COTYLEDON, *koti le'dun*, the immature leaf of a seedling. Those plants which bear one seed-leaf, like grasses and grains, are called *monocotyledons*; those which produce two seed-leaves, like the bean, are *dicotyledons*. These two classes make up the great group of flowering plants. If a bean is soaked, freed from the skin and split, its two cotyledons may readily be seen. After the bean seedling rises above the ground the cotyledons appear as two thick leaves, which gradually wither and fall off. They are followed by true leaves. In the grains the cotyledon does not push out of the seed, but forms an absorbing organ which serves to feed the growing plant germ. The cotyledons of the pea, horse-chestnut and various other dicotyledonous plants of that type also remain inside the seed coat and underground, but those of the squash and pumpkin develop as temporary green leaves above ground.

COUGAR, *koo'gur* See PUMA.

COUGH, *koff*, a contraction of the muscles which control breathing, caused by irritation of the air passages or by nervousness. While one generally coughs involuntarily, the action may be controlled by proper training. Coughing is a prominent symptom of cold on the chest, bronchitis, tuberculosis, pneumonia and catarrh of the throat. The old remedy was to take a "soothing medicine," which usually contained opium, but physicians today warn against such preparations. In tuberculosis sanitariums fresh air has been found a great aid in alleviating coughs, and the patients there are trained to refrain from coughing except when to cough brings up mucus and clears the air passages. A cough caused by nervous irritation can only be cured by the exercise of will power. The ordinary cold on the chest can often be helped by means of steam inhalation, hot and cold sponging of the chest, and the use of a cold compress. Any serious case of coughing should have the attention of a physician. See COLD.

COUNCIL BLUFFS, IOWA, founded as Kanessville in 1855 by the Mormons and given its present name in 1868, is the county seat of Pottawattamie County. It is four miles from Omaha, across the Missouri River, and is two and one-half miles east of that stream. Seven trunk line railroads enter the city—the Chicago, Burlington & Quincy, the Chicago Great Western, the Chicago & North-Western, the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago, Rock Island & Pacific, the Illinois Central, the Union Pacific, the Wabash, and the Kansas City, St Joseph, & Council Bluffs. There are large stock-yards, grain elevators, flouring mills and dozens of diversified factories; the city is one of the largest agricultural implement centers in the world. There is a municipal airport and a street railway connecting with Omaha. The city has twenty-five parks, embracing more than 1,000 acres.

The town received its name because near its site Lewis and Clark conferred with the Indians in 1804. Population, 1930, 42,048.

COUNT, a title of nobility in some European countries, corresponding to that of earl in Great Britain. Though Britain does not recognize the title, it gives the title *countess* to the wife of an earl.

COUNTERFEITING, *koun'tur fit ing*, fraudulently producing an article in imitation

of another, for the purpose of inducing the use of the false article for the genuine. The term is most commonly applied to the imitation of money. The offense is dealt with by national statutes, and it constitutes a crime punishable by fine and imprisonment, the punishment extending to as much as twenty years in prison and a fine of \$10,000.

COUNTERPOINT, in music, the adding of other melodies to a given melody or theme. The added melodies are independent of the original theme in movement, but related to it by certain rules. When a single part is added, the result is known as *two-part counterpoint*. When two points are added, the result is *three-part counterpoint*. When the notes of the added parts are of the same value as corresponding notes in the original melody, the composition is known as *simple counterpoint*, and when more than one note of the added part are made equivalent to one note of the original melody the resulting composition is called *florid counterpoint*. The term is sometimes used synonymously with harmony. The name arose from the early system of notation, in which points were used for notes; hence one point was set opposite another point.

COUNTER-REFORMATION. As the Reformation spread, the Roman Catholic Church attempted to counteract its influence by adopting certain measures to check its growth in those countries where it had already gained a hold, to prevent its further spread and to abolish abuses that had grown up in the Church. To these measures has been given the name of Counter-Reformation. The question of the reform of abuses had been receiving much attention in the Church previous to the beginning of the Reformation, but it was not until the Council of Trent (1545-1563) that any effective work was done toward this end. This council formulated a creed and discipline which is practically that of a modern Church, and which did away with the most flagrant abuses. The attempt to check the spread of Protestantism led in Italy and Spain to the Inquisition. In these two countries Protestantism was easily uprooted, because it had never had there more than a feeble existence. In Bohemia it was abolished only by means of the Thirty Years War, and in a number of other countries, particularly in the Netherlands, the attempt to replace it with Catholicism led to serious wars. See REFORMATION.

Outline on the County

I. MAP OF COUNTY

II. DESCRIPTION

- (a) Size
- (b) Number of townships
- (c) Boundaries
- (d) Position in state
- (e) Physical features
 - (1) Surface
 - (2) Lakes
 - (3) Rivers

III. GOVERNMENT

- (a) County officers
 - (1) How elected
 - (2) Terms of office
 - (3) Duties of each
 - (4) Salaries
- (b) County buildings
- (c) Taxes
 - (1) How levied
 - (2) How collected
 - (3) How apportioned

IV. INSTITUTIONS

- (a) Penal
- (b) Charitable
- (c) Educational
 - (1) Public
 - (2) Private

V. INDUSTRIES

- (a) Agriculture
 - (1) Leading crops
 - (2) Markets
- (b) Manufactures
 - (1) Leading articles
 - (2) Markets
- (c) Mining
 - (1) Leading products
 - (2) Markets
- (d) Transportation
 - (1) Rail
 - (2) Water

VI. COUNTY SEAT

- (a) How and when located
- (b) Reason for present location
- (c) Rank among county's cities and towns
- (d) Distance from other cities in state
- (e) Industrial life

VII. HISTORY

- (a) When settled
- (b) When organized as county
- (c) Famous men produced
- (d) Events which were notable

COUNTERSIGN, a private signal, word or phrase given to soldiers on guard, who are ordered to let no man pass unless he first gives that sign. The term also refers to the signature of a secretary or other official to a document signed by another. Such countersigning is for the purpose of attesting that the document is authentic.

COUNTY, a word of European origin, referring originally to a district governed by a count or earl, but now known as a political division of a state or province. It is composed of from about twelve to twenty or more townships. Each township in most states sends one man, called a supervisor, or commissioner, to a county legislative board called the board of supervisors, and all citizens of each township participate in county government and support it with their taxes. In turn, the county sends representatives to the state legislature, and all people in the county pay taxes for the support of the state government. The town in the county which is the seat of its government is called the county seat.

The outline which appears on this page is suggested as the basis for an essay on the story of any county.

COUNTY AGENT. See FARMERS' INSTITUTE.

COURLAND, *koor'land*, formerly a province of Russia, one of the so-called "Baltic provinces" that set up independent governments in 1917, after the abdication of the czar. When, early in 1918, Russia renounced all claim to the Baltic provinces by the Treaty of Brest-Litovsk, German troops occupied Courland and overthrew the new government. Before the close of the year Germany itself surrendered to the allies, and the German forces thereupon withdrew. In November, 1918, a movement for independence culminated in the proclamation, at Riga, of the Free State of Latvia, which included practically all of Courland, and certain other districts, formerly Russian.

The province was south of the Gulf of Riga and the province of Livonia, east of the Baltic Sea, and west and north of Lithuania. With an area of 10,435 square miles, it was about the size of New Hampshire and Rhode Island combined. Agriculture, cattle raising and fishing are the chief occupations of the people, who numbered 812,300 when Latvia took possession. The majority of them are Letts. See LATVIA.

COURT, a tribunal established for the administration of justice. Its duty is to try and punish persons accused of committing offenses against the State, the public or individuals, and to settle controversies. Courts have existed from remote times and probably had their origin in the executive power possessed by kings or chiefs, or in the power of

court Court of Appeals, and under certain conditions may reach the United States Supreme Court. In addition to this system involving the three courts with which the public is most familiar, there are other Federal courts, each having special jurisdiction. The following table presents the facts with respect to all of them:

TITLE	ORGANIZATION	JURISDICTION*
Supreme Court.	A chief justice, \$20,500, eight associates, \$20,000.	This court has original jurisdiction in all cases relating to ambassadors and other public ministers and consuls, and in those to which a state is a party. It has appellate jurisdiction in all cases originating in the inferior courts, save such as Congress by law shall except. Appeals may be made to it, and writs of error lie to it, from the district courts, from the courts of appeals, and from the supreme courts of the District of Columbia and the territories.
Circuit Courts of Appeals	Ten circuits, to each of which are assigned one Justice of the Supreme Court and from two to five circuit judges, thirty-two circuit judges in all, salary, \$12,500	Appeals from district and territorial courts.
District Courts.	One hundred and three districts, including Alaska Hawaii and Porto Rico, each with a district judge, salary, \$10,000	Criminal prosecutions for violation of Federal laws, and cases connected with revenue and postal laws, bankruptcy and admiralty matters. In a general way district courts have jurisdiction in all cases assigned by the Constitution (Article III) to the Federal judiciary, except those cases in which original jurisdiction is imposed on the Supreme Court.
Court of Claims	A chief justice, and four associates, each \$12,500	Over money claims of individuals against the government.
Court of Private Land Claims	A chief justice, and four associates, \$10,000	Decides conflicting claims of title to certain public lands.
Court of Appeals District of Columbia	A chief justice, and two associates, each \$12,500	Hears appeals from the supreme court of the District of Columbia.
Supreme Ct District of Columbia	A chief justice, \$10,500, four associates, \$10,000	Resembles in jurisdiction other United States district courts.
Territorial Courts	Judges appointed for four years	Resembles United States district courts.
Admiralty	Courts, Commissioners' Courts, and Courts-martial	

*The supreme court has both original and appellate jurisdiction, the circuit courts of appeals, and the court of appeals for the District of Columbia, have only appellate jurisdiction; the other courts only original jurisdiction.

pardon belonging to priests and other church dignitaries. The systems of courts differ among different modern nations, but their general powers and constitutions are the same, their acts being in most cases independent of all other authority and their decisions being regarded as final in most cases.

United States Courts. These courts, excepting the Supreme Court, are concerned only with cases arising from the violation of Federal statutes. The lowest is the United States District Court; appeals go to the Cir-

State Courts. The courts of the state differ in powers and jurisdiction in the various states. At the foot of the whole system are the *justices of the peace*, who try petty criminal and civil suits. In some states there are *county courts*, which hear appeals from justices and have original jurisdiction in some cases. Next come *circuit courts*, each of which has jurisdiction over several counties and hears appeals from the lower courts. Over all is the *supreme court* of the state, usually a court of appeal only, but occasional-

ly having original jurisdiction. In some states there are slight variations of this system. Cases may be carried from the supreme court of the state to the Supreme Court of the United States, usually in questions involving the interpretation of the United States Constitution.

Courts in Canada. As in the United States, there are two classes of courts, Dominion and local. In the former class there are two courts, the Supreme Court of the Dominion and the Exchequer Court, the members being appointed by the Dominion (Governor-General in Council). The provincial court judges, except justices of the peace and city magistrates, are also paid by the Dominion government, and the judges in each province receive appointment from the Dominion government. The jurisdiction of each court is similar to that of courts of like grade in the United States.

Related Articles. Consult the following titles for additional information.

Admiralty Court of Canada	Justice of the Peace
Court of Claims	Juvenile Court
Exchequer Court of Canada	Law (with list)
Judge	Morals Court
Judicial Department of Canada	Probate Court
Jury and Trial by Jury	Procedure
Justice, Department of	Supreme Court of Canada
	Supreme Court of the United States

COURT FOOL, a name given to the professional jesters who were common at courts during ancient and mediæval times. Such persons were known in the time of Philip of Macedon, but they formed a more important part of court life during the Middle Ages than at any other time. The fool dressed in gay colors, with a cap ornamented with bells and surmounted with ass's ears, carried a scepter, usually ornamented with bells, and wore a large collar. The Stuart kings were the last English kings to have court jesters, but at the Russian court such personages existed to the nineteenth century, and Marie Antoinette of France had a jester just before the Revolution. Shakespeare in several of his plays, as *King Lear*, *As You Like It* and *Twelfth Night*, introduces the court fool.

COURT-MARTIAL, *kort mahr'shal*, a court consisting of military or naval officers, for the trial of military or naval offenses. In the army of the United States there are general courts-martial, before which only officers can be tried, and regimental and garrison courts-martial. In the navy summary courts-martial are held for the trial of petty

officers and persons of inferior rating, and general courts-martial for the trial of the higher officers.

COURT OF CLAIMS. Under the American system no citizen can bring suit against the Federal government. To provide an avenue through which justice may be secured Congress established the United States Court of Claims in 1855. Five justices sit in this court, one of whom is designated chief justice; they are appointed by the President for life, or during good behavior. The salary of the chief justice and of each associate justice is \$12,500 per year.

Claims allowed by the court are paid out of Congressional appropriations, always maintained for the purpose. If the amount at issue exceeds \$3,000 an appeal from an adverse decision may be made to the United States Supreme Court.

COURT-PLASTER, black, flesh-colored or transparent silk, varnished over with a solution of glycerine and isinglass and often perfumed with benzoin. It is now used for covering slight wounds, but it is said to have received its name from the fact that at one time the ladies of the court wore it on their faces in patches, to make their complexions appear more brilliant.

COURTSHIP OF MILES STANDISH, a popular poem, written by Henry W. Longfellow and published in 1858. It is a story of Plymouth colony, and is based on a tradition that seems to have a foundation of truth. The chief characters are Captain Miles Standish, John Alden and Priscilla Mullens. The last named was a beautiful girl whose charm won the heart of the sturdy Captain, a widower since the first winter of the struggling colony. Captain Standish was brave when it came to fighting Indians, but timid in the matter of proposing, and he requested his staunch friend John Alden to plead his suit for him. It so happened that John loved Priscilla himself, and Priscilla knew it, and when he tried to plead for the Captain the maid replied, "Why don't you speak for yourself, John?" In the poem the two were married with the blessing of the Captain, but the prose version of the story, which gave Longfellow the basis for his poem, states that Standish never forgave his friend. Longfellow himself was a descendant of the Aldens, and a house built in 1653 by John Alden is still in the possession of a member of the family.

COVENANTERS, *kuv'e nan tirs*, a term applied to those people in Scotland who bound themselves by a series of covenants to maintain Presbyterianism in the country. See COVENANTS.

COVENANTS, *kuv'e nants*, a term used in the Bible in several indefinite senses, sometimes with the meaning of *promise*, sometimes in place of *agreement*. Covenants between man and man are frequently mentioned, but special emphasis is laid upon those between God and the Israelitish nation, given through Noah, Abraham and others. This was a pledge of God's blessing upon the Israelites in return for their faith and devotion.

The term was used by the Scottish people to denote associations or bands of persons joined together for mutual support and assistance, either in the maintenance of a principle or in resistance to oppression. Two of these covenants were especially noted, namely, the *National Covenant* of 1638 and the *Solemn League and Covenant* of 1643. The first had for its object the maintenance of the Presbyterian or Reformed religion and grew out of the fear in Scotland that Charles I would introduce the English *Book of Common Prayer* and increase the power of the Scottish bishops. The *Solemn League and Covenant* was a contract entered into between the General Assembly of the Church of Scotland and commissioners in the English Parliament, according to which Scotland was to furnish an army to help the English against Charles I, upon the condition that Presbyterianism be made the established religion in England, Scotland and Ireland. Both covenants were abrogated after the restoration of the Stuarts in 1660, and their adherents were severely punished and regained freedom of worship only after the revolution of 1688.

COVENTRY, *kuv'ent ry*, ENGLAND, a city in the county of Warwickshire, eighty-five miles northwest of London. It is also the Parliamentary and municipal borough for the county. Coventry is a place of great antiquity. In 1043 Earl Leofric and his wife, Lady Godiva (see GODIVA, LADY), founded here a Benedictine monastery, and many religious mysteries and pageants were acted before the king in the fifteenth century. Henry VIII destroyed this abbey and the ancient walls which surrounded the city. To-day there are several fine churches, Saint

Michael's being the largest parish church in England. Coventry is a prosperous manufacturing city, and owing to its rapid industrial growth the boundaries have been extended. Its chief manufactures are bicycles, automobiles, ribbons, watches, sewing machines and munitions. Population, 1931 census, 167,046.

COVERDALE, *kuv'ur dale*, MILES (1488-1568), the first Englishman to bring out a complete translation of the Bible into printed English. At the beginning of the Reformation he was in an Augustinian monastery at Cambridge, but he soon adopted the doctrines of the Reformation and became their very enthusiastic supporter. In 1535 he published his English translation of the Bible, and the Psalms of his translation are still used in the Book of Common Prayer. In 1550 Coverdale was made bishop of Exeter. He held this office until 1553, when, on the accession of Mary, he was thrown into prison. The next year he was released and obliged to leave England, but after the accession of Elizabeth he returned.

COVINGTON, *kuv'ing ton*, KY, the second largest city of the state, is one of the county seats of Kenton County, at the junction of the Ohio and the Licking rivers, opposite Cincinnati, and on the Louisville & Nashville, Chesapeake & Ohio, and Cincinnati Southern railroads. The city is connected with Cincinnati by a suspension bridge 2,763 feet long. Newport is a neighbor, on the east. Covington is a residence town for many Cincinnati business men. There are many handsome private dwellings and public buildings, among which are a public library, a fine Federal building, Notre Dame Academy and a beautiful cathedral. There are extensive manufacturing industries, including distilleries, cotton and woolen mills, packing establishments and glass factories. The city was settled in 1812 and was chartered in 1834. Population, 1920, 57,121, in 1930, 65,252.

COWBIRD, or **COW BUNTING**, so called because usually found near cattle, is an American bird of the starling family, which resembles the European cuckoo in that it lays its eggs in the nests of other birds and leaves them to be hatched by the foster parent. While a single bird lays several eggs, it has never been known to deposit more than one in the same nest. The small birds whose nests are used for this purpose do not usually seem

to notice the difference, and the young cowbird, being larger, secures most of the food intended for the true children. Sometimes, however, the yellow warblers and other small birds recognize the presence of the intruding egg and abandon the nest or seal it over and build another upon the top of the old one, rejecting not only the strange egg but all of their own, as well. From its peculiar habit of making no nest, the cowbird is sometimes called the *lazy bird*. There are usually more males than females in a flock.

COWITCH, COW'RAGE, or COW'AGE, the hairs of the pods of certain pod-bearing plants which grow in the East and West Indies. The hairs are stiff and brittle, with finely serrated tips, which enables them easily to penetrate the skin, where they produce an intolerable itching.

COW PAR'SNIP, a large, coarse plant of the parsley family, that grows to a height of from three to six feet and bears handsome leaves and large clusters of small white flowers. Though rather striking in appearance, the cow parsnip becomes a troublesome weed if allowed to grow in damp soil near the water. There are a number of different species, but none is especially valuable, though one or two are used for fodder or as a substitute for celery.

COWPEA, a pod-bearing plant widely distributed in temperate and tropical regions, of value as a forage plant and also because it has the power of renewing the soil. This is due to the fact that it gathers free nitrogen from the air, in the manner of clover. The cowpea shows great variation of habit and appearance, and appears in creeping, bushy and tall and erect forms. It is grown extensively in the Southern United States, where it is fed green to stock and also made into hay and ensilage. Cowpea pods are considered an excellent fattening food for young pigs.

COWPENS, BATTLE OF THE, a battle of the American Revolution, fought in Spartansburg County, S. C., near King's Mountain, January 17, 1781. The English force of 1,100 under Tarleton was opposed by a thousand Americans under Morgan and other partisan leaders. The British army was attacked on both flanks simultaneously, and the whole force, with the exception of 270, was captured or killed. The Americans lost but twelve killed and sixty-one wounded.

COWPER, WILLIAM (1731-1800), an English poet, the author of several beautiful and familiar hymns. He lost his mother when he was but six year old, and was placed at a school in Hertfordshire, from which, on account of rough treatment from one of his schoolmates, he was removed when ten years of age.

He left Westminster School at eighteen and was then apprenticed for three years to a solicitor, and at the expiration of his service he took chambers in the Middle Temple. In 1754 he was called to the bar. The interest of his family procured for him the post of clerk to the House of Lords; but having to appear for examination at the bar of the House, his nervousness was such that on the very day appointed for the examination he resigned the office and even attempted suicide. Soon afterward he became insane, and from December, 1763, to June, 1765, he remained under the care of Doctor Cotton at Saint Albans. The skill and humanity of that gentleman restored him to health, and he went to live in Huntingdon.

Here Cowper became acquainted with Mr. and Mrs. Unwin, in whose house he lived for some time. When Mr. Unwin died, Mrs. Unwin moved with the poet to Olney, where she carefully tended him through a second attack of his malady. In 1776 he commenced a poem on the *Progress of Error*, which he followed by three other poems, *Truth*, *Table Talk* and *Expostulation*. These, with some others, were published in a volume in 1782. One of his friends, Lady Austen, suggested *The Task*, which on its publication in 1785 made Cowper famous. It had a real effect in helping to bring into poetry a spontaneity and a feeling for natural beauty, in contrast to the artificiality of most of the poetry of the eighteenth century. *The Diverting History of John Gilpin*, by which Cowper is perhaps best known, is also due to the suggestion of Lady Austen. The translation of *Homer*, begun in 1784, occupied him for the next six years, and was published in 1791. He removed during its progress from Olney to Weston. In the beginning of 1794 he was again attacked with insanity. Cowper's *Olney Hymns*, published in 1779, include such well-known songs as *Oh! for a Closer Walk with God*, *God Moves in a Mysterious Way* and *There is a Fountain Filled with Blood*.

COWPOX, a disease which appears on the teats of the cow, in the form of eruptions. This is the same disease as smallpox in man, and the fluid from cowpox eruptions injected into human beings gives them a mild form of the disease and protects them from its virulent forms. Milk from diseased cows should never be used as food. See **VACCINATION**; **SMALLPOX**.

COW'RIE, or **COWRY**, the shell of a small mollusk, which in some parts of Africa and in many parts of Southern Asia has long been used as money. The practice is yet common among inland tribes. The shells vary in value in different localities. The beauty of these shells has given them a place among ornaments, and both civilized and uncivilized nations have always used them.

COWSLIP. In England this name is given to the primrose, a pretty little herb found in pastures and meadows. It has a cluster of buff-yellow, scented flowers, in the midst of a rosette of spreading leaves. In North America the marsh marigold, a large yellow-flowered plant of the buttercup family, is called cowslip. This grows in swampy places, and in early spring its leaves and stems are often gathered for greens. The flowers are a bright yellow. The beautiful plant of the primrose family, known in the Western states as the shooting star, is called the American cowslip, while the Virginian cowslip belongs to the borage family and is known as the bluebell, or lungwort.

COX, JAMES M. (1870-), Democratic nominee for President in 1920, a newspaper owner and editor, controlling the Dayton (O.) *News* and Springfield (O.) *Press-Republic*. He is an Ohioan, born at Jacksonsville, March 31, 1870, was apprenticed as a printer after leaving high school, and by degrees worked his way to influential station. He served two terms in Congress, being first elected in 1910, was elected governor of Ohio in 1913 and twice reelected; he occupied this office when chosen standard bearer of the national Democratic party. In his campaign he visited over thirty states and spoke several times daily to great numbers of people. His home is in Dayton.

COX, PALMER (1840-1924), an American artist and author, known especially as the creator of the "Brownie" pictures and verses. He was born in Quebec, and lived for some time in California, beginning his literary work with contributions to the *Golden Era*

and other Western papers. In 1875 he moved to New York City, where he commenced his work as illustrator and writer for children's magazines and books. His works include *The Brownies*, *Their Book*; *The Brownies in Fairyland* and *The Brownies in the Philippines*.

COYOTE, *ki'ote*, or *ki'ote*, the most disliked of all members of the wolf family, is an animal about forty inches long and eighteen inches high. He is sneaking in his habits, is apparently always hungry, and is a constant menace to small domestic animals and poultry in neighborhoods he infests. Few animals are more fleet-footed.

CRAB, the name given to nearly a thousand species of shellfish. Many of them are classed as a food, but they contain slight nutriment, being really little more than a delicacy. Enough of them are eaten to raise crab fishing to the plane of a profitable industry.

The head and breast are united, and the whole is covered with a strong shell. The mouth has several pairs of strong jaws, in addition to which the stomach has its internal surface studded with hard projections for the purpose of grinding the food. The liver is the soft, rich, yellow substance usually called the *fat* of the crab. The young crabs throw off their covering at intervals as they increase in size, but after they are full-grown, three or four years at least may pass without a change of this character. The first pair of limbs are not used for locomotion, but are furnished with strong claws or pincers, and the right claw is generally larger than the left. The crab's eyes are compound and are placed upon stalks, which sometimes are over an inch in length.

Crabs generally live on decaying animal matter, though some live on vegetable substances, as the *racer crabs* of the West Indies, which suck the juice of the sugar cane. Crabs inhabit both sea water and fresh water; some live on the land, only going to the sea to spawn.

Related Articles. Consult the following titles for additional information:

Crawfish	Hermit Crab
Crustacea	Horseshoe Crab

CRAB APPLE, a tree which bears a small, tart fruit much used in making jellies and preserves. The name is somewhat loosely applied to any apple tree producing a sour, uncultivated fruit, but properly it refers to the wild varieties of the true apple, from

which the latter is produced. The best known crab apple grown in America is the narrow-leaved variety, found from New Jersey to Illinois and Kansas, and south to Louisiana and Florida. Another variety, distributed from Ontario to Michigan and as far south as South Carolina, bears a greenish-yellow fruit of very sweet scent. A very excellent grade of crab apples comes from the Bitter Root Valley in Montana.

CRACOW, or **KRACOW**, *kra'ko* (Polish) or *krah'kou* (German), once the capital of the kingdom of Poland, and later the capital of the Austrian province of Galicia. Since 1918, it has been a part of Poland, and capital of a county of the same name. In historic associations no Polish city or town is its rival. Here, in the six-centuries-old Stanslaus Cathedral, the kings were crowned, and here he buried the nation's heroes—John III, Sobieski, Kosciuszko, Poniatowski, Mickiewicz, and Pilsudski.

Situated on the left bank of the Vistula, which separated it from Russian soil, Cracow was of great strategic importance, both in a commercial and in a military sense. From it spread out the main railway lines running into the heart of Germany and Austria. Its trade, by rail and water, is chiefly in lumber, grain, cattle and salt, the salt mines, eight miles away, being among the largest in Europe. The city's ancient walls, dating from the Middle Ages, have long been torn down; it has modern fortifications, which, however, could not withstand the impact of present-day artillery.

After the dissolution of the Dual Monarchy, Austria-Hungary, in 1918, at the close of the World War, the fate of Cracow remained for some time a political problem. The province of Galicia, of which it was the principal city, was finally awarded by the Peace Conference to ambitious Poland, which found in the results of the war an opportunity to reestablish its independence on a scale comparable to the glory of former days. Cracow is now fifth city in size in the new Poland. Population, 1932, 221,260. See **POLAND**; **WORLD WAR**.

CRADDOCK, **CHARLES EGBERT**. See **MURFREE**, **MARY NOALLS**.

CRAIGIE, *kra'ge*, **PEARL RICHARDS** (1867-1906), an English novelist and dramatist, who wrote under the pen name of **JOHN OLIVER HOBBS**. She was educated in England, though born in Boston, Mass. Her

style was brilliant and she was especially skilful in her handling of dialogue. Among her books are *The Gods*, *The Vineyard*, *Flute of Pan* and *The Dream and the Business*. Her plays include *A Repentance* and *Journeys End in Lovers' Meeting*, the latter written for Ellen Terry.

CRAIK, **DINAH MARIA MULOOK** (1826-1887), an English novelist, known chiefly for her story *John Halifax, Gentleman*, which has always been very popular and has been widely translated. Among her less generally known novels are *The Ogilvies*, *Olwe*, *A Life for a Life* and *Mistress and Maid*. She also wrote two popular children's stories, *The Little Lame Prince* and *The Adventure of a Browne*.

CRABBERRY. See **CROWBERRY**.

CRAN'BERRY, a small, red, acid fruit, first found in Northern Asia and Central Europe, but now domesticated in nearly every temperate zone. Because it grows only on low, swampy land or on peat bogs it is called in some localities *moss berry* or *moor berry*. The berry, when ripe, is globose and is a little more than a quarter of an inch in diameter. The American cranberry has larger berries than the European species and is extensively cultivated in some localities. New Jersey, Wisconsin and the Cape Cod peninsula furnish the greater part of the million bushels harvested yearly in America.

CRANE, a machine for raising and moving heavy weights. The most common form of crane is the ordinary derrick (see **DERRICK**). The power may be applied to a crank by hand, or to a train of wheelwork by a steam engine or an electric motor. The hoisting engine is in ordinary use for furnishing power for cranes of this sort, where buildings or other structures are being erected. The weight is hoisted by winding a rope or cable around a cylinder. In shipyards, steel mills, locomotive works and other places where heavy weights have to be moved from one part of the yard or factory to another, the traveling crane is employed. This consists of a hoisting device similar to that used on the ordinary crane, with the exception that no jib is used. This device is mounted on a traveling table, which runs on rails supported on the opposite sides of the building, or on a trestle constructed for the purpose. These cranes are usually operated by electric motors. One motor operates the hoisting

machinery, and another operates the machinery by which the crane is moved over the track. Cranes of this pattern are constructed with sufficient power to lift an entire locomotive and carry it from one part of the factory to another where it is set down as lightly as though it weighed but a few pounds.

CRANE, the common name of a number of different species of wading birds, generally of

rather large size and remarkable for their long necks and stilt-like legs, which fit them for living in marshes and lands that are frequently overflowed. The food of cranes is partly of vegetable matter, but they also eat insects, worms, frogs,



CRANE

reptiles, small fish and the spawn of various aquatic animals. They nest among the bushes or in the marshes and lay but two eggs. The cranes spend their summers in the north temperate regions, but on the approach of winter they make exceedingly long migrations to the south.

They feed chiefly in the early part of the day and spend the rest of the time often dozing, standing on one leg, with the head drawn back on the shoulders. Some species are easily domesticated and are regarded as sacred in parts of Japan and India. Some species carry beautiful crests of long, slender feathers, and most of them are noted for the peculiar dances and antics through which they go during courtships. The *demoiselle crane*, found in Central Asia and in winter in Africa, is especially noted for its graceful performances. In North America there are three species, the whooping crane being the largest. The windpipe of this crane is coiled at the lower end into the crevices of the breast bone and is sometimes eight feet in length. This accounts for the peculiar resonance of the bird's cry.

CRANE, STEPHEN (1870-1900), an American novelist, born in Newark, N. J. He studied at Lafayette College and Syracuse University and then began newspaper work. While thus engaged, he wrote and published, at his own expense, *Maggie, a Girl of the Streets*, a realistic novel of street and slum life. *The Red Badge of Courage*, which eventually came into wide notice, was written before the author attained his majority. The story deals with a raw recruit in battle, and his first fear on confronting the foe and hearing the whistle of shot and shell are described in a most vivid manner. Crane was able to describe the battle scenes and tactical evolutions in such a way as to deceive the critics, who declared that such descriptions could only have been written by an old veteran. Among his other books are *The Little Regiment*, *On Active Service* and *Whilomville Stories*.

CRANE, WALTER (1845-1915), an English painter and engraver, born in Liverpool. Among his works are *Birth of Venus*, *The Fate of Proserpina*, *Plato's Garden*, *Date Trees on Monte Pincio* and *End of the Year*. Crane is specially known for his drawings on juvenile subjects, among which are *Echoes from Hellas*, *Flora's Feast* and *Queen Summer*. He has made designs for glass windows, tapestries and the like, and was the author of *An Artist's Reminiscences*.

CRANIAL NERVES. See **NERVES**, **CRANIAL**.

CRANMER, THOMAS (1489-1556), Archbishop of Canterbury, famous for the part he played in the English Reformation during the reign of Henry VIII. In January, 1533, he was appointed Archbishop of Canterbury, and zealously promoted the cause of the Reformation; through him the Bible was translated and read in churches, and monastic institutions were vigorously suppressed. Henry VIII appointed him by will one of the Council of Regency to Edward VI. By the will of Edward VI, his sister Mary was excluded from the crown, and Cranmer upheld the cause of Lady Jane Grey. With others who had been most active in Lady Jane's favor, he was sent to the Tower when Mary ascended the throne. He was tried on charge of treason and condemned to die, but was not executed on that sentence. In 1554, with Latimer and Ridley, he was removed to the common jail on the charge of heresy. Cranmer signed sev-

eral recantations, but he finally said he would retract all his hand had written in fear of death. He was burned at the stake, and when the fire was lighted he thrust his hand into it, saying, "This hath offended: Oh, this unworthy hand!"

CRANSTON, R. I., a town in Providence County, on the New York, New Haven & Hartford railroad. It is a residence place near Providence, of which it was a part until 1754. There are manufactures of cotton goods, tools, machinery, valves, and beer. The town has village libraries, state reform schools for boys and girls, a state prison, an almshouse, an insane asylum and a workhouse. There is a state airport a mile distant, serving this city and Providence. Population, 1920, 29,407; in 1930, 42,911.

CRAPÉ, or **OREPE**, a crinkled, wiry, transparent stuff, made of raw silk, well twisted and gummed, and commonly dyed black, to be used for mourning garments. It is manufactured in Italy, England and France. China crape, or *crêpe de chine*, is a soft, white or colored silk fabric, of gauzy texture and wavy appearance, used for ladies' scarfs, shawls, hat trimmings and evening dresses. A woolen fabric made with a crinkled surface is also called crape, and the name crape paper is applied to a crinkled paper used for table decorations, napkins, etc.

CRASSUS, MARCUS LICINIUS (114-53 B. C.), a famous Roman, surnamed *Dives* (the rich). He took part with Sulla in the Civil War, and in 71 B. C. he defeated Spartacus (which see) at Rhegium. In 70 he was elected consul, with Pompey as his colleague, but the two shortly came into conflict and were not reconciled until 60 B. C., when Caesar induced them to form with him the first triumvirate (which see). Five years later Crassus again became consul, and, obtaining Syria for his province, he made war on the Parthians, but was defeated and slain.

CRAWFISH, or **CRAYFISH**, the name of various crustaceans (see **CRUSTACEA**). In structure they are very like the lobster, and the young are carried under the broad tail of the mother in the same way as with the lobsters. The crawfish inhabits the fresh waters of North America, Europe and the north of Asia, and is common in some of the streams of England, where it is considered an excellent article of food. It lurks under stones or in holes in the banks. Its food con-

sists of small mollusks or fishes, the larvae of insects and almost any sort of animal matter. Some crawfish, by their burrowing habits, injure mill-dams and levees. About thirty species are known in America, where they are often called crabs.

CRAWFORD, FRANCIS MARION (1854-1909), an American novelist, who vividly portrayed life in foreign lands. He was the

son of Thomas Crawford, a sculptor, and was born in Italy. Crawford received his education at Concord, N. H., in Trinity College, Cambridge, and at Karlsruhe and Heidelberg. At Rome he devoted himself to the study of Sanskrit, and during 1879 and 1880 was engaged in press work at Allahabad, India. He was selected by the government committee to write the national ode at the centennial of the American Constitution, Sept. 17, 1887. His first novel, *Mr. Isaacs* (1882), was a book of striking and quite unusual merit and at once won for its author popularity. The rich romantic elements in certain of the aspects and contrasts of modern Oriental life were a distinct discovery to worked-out novelists. Among its successors are *Dr. Claudius*, *A Roman Singer*, *Zoroaster*, *The Story of a Lonely Parish*, *Saracinesca*, *The Witch of Prague*, *Paul Patoff*, *Don Orsino*, *Sant' Ilario*, *In the Palace of the King* and *The White Sister*. He possessed imagination, originality and vigor, and used a graceful and vivid style.

CRAWFORD, THOMAS (1814-1857), an American sculptor, born in New York. He studied in Rome and became the pupil of Thorwaldsen. His best known works comprise *Orpheus and Cerberus*, *Adam and Eve*, *Hebe and Ganymede*, *Mercury and Psyche* and *The Indian*. He executed important works for the National government and for the State of Virginia. Perhaps his most important work is the statue of *Liberty*, nineteen and a half feet high, which surmounts the dome of the Capitol building at Washington.

CRAWFORDSVILLE, IND., founded in 1822 and made a city in 1865, is the county seat of Montgomery County, forty miles



CRAWFISH

northwest of Indianapolis, on the Cleveland, Cincinnati, Chicago & Saint Louis, the Pennsylvania, and the Monon railroads. The city is the seat of Wabash College (400 students), it has a Carnegie Library and a \$100,000 Y. M. C. A. building. The home of General Lew Wallace, author of Ben Hur, was here. Wire, nails, caskets, and ladies' coats are manufactured. Population, 1920, 10,139, in 1930, 10,355.

CRAYFISH. See **CRAWFISH.**

CRAYONS, pencils in various colors made of clay, plumbago, chalk and other material, such as pigments for colorings. Crayons used in drawings to be photographed are commonly made of a mixture of wax, soap, resin and lampblack. Black crayons are made of the finest quality of charcoal. A kind of *crayon painting* is practiced to some extent, the coloring matter in a soft state being rubbed on with the finger. Its chief advantages consist in the facility of its execution and the soft beauty and richness of the coloring.

CREAMERY, *cream'ury*, or **BUTTER FACTORY**, a factory where butter is made. Creameries are organized on three plans: by the association of farmers of the neighborhood, who build and operate the creamery and share proportionally in its profits; by the formation of a stock company, in which the stockholders are patrons, and by individuals, who build the creamery, buy the milk and sell the butter. Creameries gather both cream and milk and pay for each according to the amount of butter fat it contains, this being determined by a milk or cream tester. The by-product of the creamery is skim milk, most of which is returned to the patrons or is sold. It is taken to the farms and fed to calves or pigs. Dried curd, or casein, is also made from it and is of some commercial importance.

A well-equipped creamery contains apparatus for testing the milk and cream, a tank for receiving the milk, another for holding the cream and a third for the skim milk. The machinery consists of a motor, which is usually a gas engine, the cream separator, churns and butter works. An average-sized creamery will use from 8,000 to 10,000 pounds of milk in a day, and some of the largest have a capacity for making fifteen tons of butter every twenty-four hours. Creameries are in charge of skilled butter-makers, who have usually learned their trade

at agricultural experiment stations or agricultural colleges.

In the United States Wisconsin leads in the output of creamery butter, and in Canada, Ontario and Quebec together produce about nine-tenths of the Dominion's yield. See **BUTTER**; **DAIRYING**; **MILK.**

CREAM OF TAR'TAR, or **POTASSIUM BITAR'TRATE**, exists in grapes, tamarinds and other foods. It is prepared from the crystalline crust called *argol*, deposited on the vessels in which grape juice has been fermented. The argol is dissolved by boiling with water, the mixture is filtered and the cream of tartar is allowed to crystallize. The commercial product usually contains a small percentage of calcium tartrate. It is frequently employed in medicine, in dyeing wool, to fix colors and as a part of baking powder.

CREAM SEPARATOR, a machine by which cream is separated from milk. The various models now in use all conform to the same principle, that of centrifugal force (which see). The separator consists of a revolving bowl, or drum, into which the milk flows. The bowl is made to whirl around at the rate of 5,000 to 8,000 revolutions a minute, and as it revolves the cream collects at the center, while the heavier parts of the milk are thrown against the outer rim. There are separate tubes through which the cream and skim milk flow out. These machines are operated by hand, electric, steam, water and horse power. See **MILK.**

CREASY, *kre'sy*, EDWARD SHEPHERD, Sir (1812-1878), an English historian, remembered chiefly as the author of *Fifteen Decisive Battles of the World* (see Article under that title). In 1840 he was appointed professor of history at the London University, and in 1860 was made chief justice of Ceylon, receiving at the same time the honor of knighthood.

GRECY, *kre'sé*, FRANCE, a town about 100 miles north of Paris, celebrated for the victory gained there by Edward III over a French army under Philip VI, August 26, 1346. About 300,000 of the French army were slain, including King John of Bohemia and many of the nobles. This battle was the first important conflict of the Hundred Years' War (which see). It was one of the first battles in which gunpowder was used, and it marked a definite step in the decline of feudalism, as it demonstrated the superiority

of the common foot-soldier over the knights in armor. At Crecy the English Black Prince won fame.

CREDIT, in economics, is the confidence existing between the creditor and his debtors, by which the payment of amounts due is postponed. This confidence may be based on either or both of two factors, trust in the honor and ability of the debtor, or security deposited by him to assure the payment of the debt. A common example of the former kind of credit is that of the so-called *trust*, or *book accounts*, of retail merchants.

Credit transactions involving the giving of security are usually evidenced by a so-called instrument of credit—that is, a note, bill, mortgage or bond. Transactions of this latter kind have become common in business, for when a debt is evidenced by a written instrument, the account can be transferred from one party to another, and money can be raised immediately, even before the debt is due. The development of the credit system in business is of comparatively recent date, and its growth has been favored by several movements, namely, the general raising of moral standards incident to advancing civilization, and the gradual increase in the rigidity of business law, through statutes and judicial interpretation, always toward the greater security of the creditor.

The credit system to-day underlies a vast majority of commercial transactions. Its advantage lies in the fact that by obviating the use of actual money in many instances, it frees for investment and other commercial purposes funds which otherwise would have to be held for use in minor affairs. It is in this way that modern banks have become such an important part of the industrial system. By collecting wealth which has been lying idle in the hands of a great number of persons who are either unwilling or unable to make loans, they make possible transactions of much greater importance. See **BANKS AND BANKING**.

Public Credit. This term signifies the confidence which men feel in the ability and disposition of a nation to pay its debts. Government bonds are promissory notes, and because of faith in the stability of a nation and the manifest intention to meet its obligations, the government can borrow unlimited amounts at very low rates of interest.

CREDIT, LETTER OF. See **LETTER OF CREDIT**.

CREDIT MOBILIER OF AMERICA. This was a title adopted by a joint stock company organized in Pennsylvania in 1863, with a capital of \$2,500,000. In 1887 the charter was purchased by a company organized for the construction of the Union Pacific Railroad, and in 1872 it became known that several members of Congress, as well as the Vice-President, were secret stockholders. This fact, together with the enormous rights and profits connected with the company, led to a congressional investigation, which developed a huge attempt at bribery and corruption. It was charged that several leading advocates of the plan had been bribed by donations of large blocks of shares in return for their influence. As a result, resolutions of censure were passed by Congress, and one member was sentenced to expulsion, but the sentence was never carried out. The scandal, after a time, died away, and the road proposed was finally built.

CREE, once one of the largest and strongest of the Algonquian tribes. They originally occupied a large territory in what is now Manitoba and Saskatchewan. After the whites began to settle the country the Cree Indians sold their lands to the Canadian government.

CREED, a statement of what one believes, employed most generally in regard to religious beliefs. The Apostles', the Nicene, the Chalcedonian and the Athanasian may be said to form the great creeds of the Christian Church.

The Apostles' Creed is so called from the belief that it originated with the Apostles themselves. The present text dates from the year 500, but evidently depends upon an earlier form, which may be traced back to about A. D. 150. The Nicene, the next oldest creed in the history of the Church, was adopted by the Council of Nice, A. D. 325, to settle the controversy concerning the dignity and character of Christ, and its essence is the expression of the belief that "Christ is of the same substance with the Father."

The Creed of Constantinople, which supplements the Nicene, emphasizes in particular the divinity of the Holy Ghost. The Athanasian Creed, dating from about the sixth century, is so called because it embodies particularly the doctrines of the Holy Trinity and the incarnation of the Son of God, which were so ably upheld by Saint Athanasius. These creeds were later supplemented

by the Councils of Trent and of the Vatican. Besides these great creeds, the various Protestant churches have their confessions of faith, which give a more detailed statement of their doctrines. Thus, the Lutheran Church has the *Symbolic Book of the Evangelical Church*; the Church of England, the *Thirty-nine Articles*, and the Presbyterians, the *Westminster Confession of Faith*, which is one of the most elaborate of all creeds and grew out of the Puritan agitation of the seventeenth century.

CREEKS, once the strongest Indian confederacy south of New York, excepting the Cherokee. The Creeks occupied a large portion of Georgia and Alabama and probably numbered 30,000. They built log houses in permanent villages. During the Revolution they sided with the English, and in the War of 1812 a part of them rose against the Americans and indulged in the terrible massacre at Fort Mims. In 1814, in a fierce battle at Horseshoe Bend, they were completely defeated. They stubbornly resisted every effort of the government to educate them and refused to give up their lands until they were forced to do so. They are now living in Oklahoma, and have accepted American citizenship. The lands of the Creeks are rich in oil, and many of these Indians have become very rich. They number about 7,000. See FIVE CIVILIZED TRIBES.

CREEPER, a name given to almost any

brown creeper of the United States and Canada is a good example. It builds its nest in holes or in the crevices of trees, and it is remarkably active in its habits. It begins at the bottom of a tree and works rapidly up, searching all the crevices of the bark. When it decides to leave the tree, it flies to the bottom of another and again works its way up, using its sharp-pointed tail feathers to push itself along.

CREMATION, *kre ma'shun*, the burning of the bodies of the dead. It was a frequent practice in ancient times and is now advocated on hygienic grounds by many scientific men on account of the dangers to the living caused by the presence of graveyards. From an economic standpoint cremation is advocated as a solution for the disposal of bodies in thickly-populated districts. There are some who object to it on sentimental and religious grounds, and there are others who state that since detection of criminal poisoning cannot be obtained when bodies are burned, cremation is an aid to crime. A favorable attitude toward the practice is, however, increasing.

CREOLE, *kre'ole*, the name which was originally given to all the descendants of Spaniards or Frenchmen born in the southern part of the United States and in the West Indies. The term is sometimes incorrectly applied to a mulatto, but it properly implies purity of European blood.

CRE'OSOTE, a substance discovered by Reichenbach in 1832 in wood tar, from which it is separated by a tedious process. It is generally obtained, however, from the products of the destructive distillation of wood. In a pure state it is oily, heavy, colorless, has a sweetish, burning taste and a strong smell of peat smoke or smoked meat. It is a powerful antiseptic. Wood treated with it is not subject to dry rot or other disease.

CREPE. See CRAWP.

CRESCENT, *kres'sent*, a representation of the moon in its horned state, used by the ancient Egyptians and the Greeks as the symbol of their moon goddesses. It was the emblem of the old city of Byzantium, and was adopted by the Turks when they captured Constantinople in 1453. After the establishment of the Turks in Europe, it was the universal emblem of their empire. A Turkish order of knighthood, instituted by Selim, sultan of Turkey, 1799, was known as the Order of the Crescent.



BROWN CREEPER

small bird that runs up and down the trunks of trees looking for insects. The common

CRESCENT CITY, a name proudly borne by the city of New Orleans, because formerly the greater part of the town lay in a great crescent-shaped bend of the Mississippi River.

CRESS, the name of several species of plants, most of them of the mustard family. Water-cress makes a delicious salad, as its leaves have a moderately pungent, bitterish and slightly salty taste. It grows in cool springs and rivulets.

CRETACEOUS, *kre ta'shus*, **SYSTEM**, or **CHALK SYSTEM**, a system of rocks between the Jurassic, below, and the Eocene, above, and the oldest system of the Mesozoic Era. It takes its name from the chalk beds which form a prominent feature of it in England and France, but the chalk formations constitute only a small portion of the system. In North America cretaceous rocks are numerous and extend over large areas, following the Atlantic coast from New Jersey to Florida, and the gulf coast from Florida to Texas, then extending up the Mississippi Valley to the mouth of the Ohio. They also form extensive areas in the great plains along the Rocky Mountains, extending northward as far as the mouth of the Mackenzie River and southward into Mexico. On the Pacific coast the rocks of the system appear at numerous points from California to British Columbia. The fossils show a great variety of animal and vegetable life. Among the animals were flying reptiles, birds with teeth, large sea serpents and land reptiles of great size. The plants show that trees similar to the oak, birch and poplar existed. See **GEOLOGY**.

CRETE, *kreet*, an island in the eastern part of the Mediterranean Sea, belonging to Greece since 1913. It is 156 miles long and from seven to thirty miles in width, its total area of 3,199 square miles being not quite that of Delaware and Rhode Island combined. Manufacturing and trade are insignificant; the population subsists upon the local agricultural products, which are grain, wine, oil, wool, fish, etc. The people numbered 386,400 in 1932, about one-third as many as in ancient times. The capital city is Candia, with 33,400 people in 1932. The greatest Cretan of modern times was Eleutherios Venezelos (which see).

The early history of Crete is lost in the fables of Greek mythology, in which Saturn, Zeus and Minos are spoken of as among its

kings. At one time a republic, it was the seat of the Cilician pirates till conquered by the Romans, from whose hands it passed in 823 to the Saracens and then to the Greeks again in 962. In 1204 the Byzantine sovereign sold it to the Venetians, who held it until the second half of the seventeenth century, when the Turks conquered it after a desperate struggle, ending in a siege of the capital lasting for no less than twenty years. Insurrections against Turkish rule have more than once occurred; a formidable one, fomented by Greece in 1868, was with difficulty suppressed after a long conflict. There have been many revolts and uprisings in the last fifty years, due to the discontent under the rule of the sultan. In 1898 the autonomy of Crete was guaranteed by the Great Powers. The Greek revolution of 1935 (see **GREECE**) was fomented from Crete, the home of the Cretan hero Venezelos, who was its chief promoter.

CRETONNE, *kre tah'n'*, a cotton fabric whose chief characteristic feature is its showy pattern. It is widely used to make window hangings, bags, chair covers and numerous other articles familiar to the housewife. The cloth has an uneven surface, and the colors printed on it give a peculiarly attractive effect. Flowers and conventional designs are popular patterns for cretonne. The name *cretonne* was derived from the village of Creton, in Northern France, where the fabric is said to have had its origin.

CRIBBAGE, a favorite game at cards, played with the whole pack. It may be played by two, three or four persons; and when by two five or six cards may be dealt to each. Five-card cribbage played by two persons is the most scientific game. Sixty-one points make the game; there are no tricks and no trumps, the object being to make *pairs*, *fifteens*, *sequences* or the *go*, or to prevent the adversary from doing the same.

Court cards and tens count as 10 each, and all the rest count for the number of spots upon them. Every *pair*, that is, every couple of cards of the same value belonging to different suits (two aces, two fours, two kings), counts 2; and when there are three or four similar cards, as many pairs are counted as there are different combinations of the cards, taken two at a time. Every combination of cards, the united spots of which make up fifteen, counts 2. A sequence

consists of three or more cards of any suit following one another in rank, and counts 1 for each card. When the player whose turn it is to play cannot play a card without going beyond thirty-one, the other player scores 1 for having been the nearest to thirty-one. This is called scoring 1 for the *go*. The last card played in any hand counts 1, also. When all the cards in a hand, either with or without the turn up card, are of one suit, or when all the cards in the crib, with the turn up card, are of one suit, it is called a *flush* and counts 1 for each card. When the turn up card is a knave the dealer scores 2 for *his heels*. When a knave of the same suit with the turn up card is found in the hand of either player, the player in whose hand it is scores 1 for *his nob*.

The counting is usually kept on a regular board, by means of two pins for each player. In the board are two sets of 30 holes, in groups of five, and as the game progresses the pins are moved forward. Twice around the board and into the *home* hole makes the game.

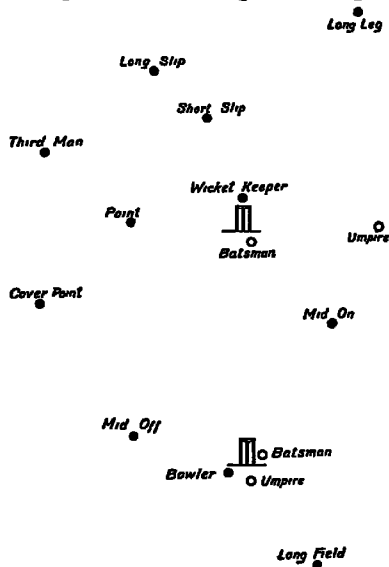
CRICHTON, *kri'ton*, JAMES (1560-1585), called *The Admirable Crichton*, a Scottish celebrity, son of Robert Crichton, lord advocate. Before he was twenty he had perfected himself in almost all the knowledge of his time, and he visited Paris, Genoa, Venice, Padua and Mantua, challenging all scholars to learned disputations, vanquishing doctors of the universities and disarming the most famous swordsmen of the time in fencing. He was latterly tutor to a son of the Duke of Mantua, and is said to have been stabbed to the heart in a dastardly manner by his pupil.

CRICK'ET, a little insect about an inch long, of a blackish or brownish color, common in houses and cultivated gardens. By rubbing together its peculiarly formed wing covers, the male can produce the pleasant chirping sound by which these insects are so well known and which has become associated with cheerful fireside scenes. There are a number of different species, which differ in color and form from the common cricket. See **MOLE CRICKET**.

During the day crickets usually remain in the ground or in darkened spots. At night they go forth in search of their food, which consists of plant life. Eggs are laid in loose soil during the fall, and these hatch in the spring.



CRICKET, the great English national game, and almost equally popular in Britain's colonies. It is played with bats, balls and wickets on a piece of smooth greensward. It is played by two opposite sets or sides of players, numbering eleven each. Two *wickets* of three *stumps* each are placed fronting each other at a distance of about 22 yards apart, the stumps being upright rods stuck in the ground, and projecting 27 inches. On the top of each set of stumps are placed two small pieces of wood, called *bails*. After the rival sides have tossed for the choice of either taking the bat or fielding, two men are sent to the wickets, bat in hand. The opposite or fielding side are all simultaneously engaged; one (the bowler) being stationed behind one wicket for the purpose of bowling his ball against



CRICKET FIELD

the opposite wicket, where his coadjutor (the wicket keeper) stands ready to catch the ball should it pass near him; the other fielders are placed in such parts of the field as are judged most favorable for stopping the ball

after it has been struck by the batsman or missed by the wicket keeper. It is the object of the batsman to prevent the ball delivered by the bowler reaching his wicket, either by merely stopping it with his bat or by driving it away to a distant part of the field. Should the ball be driven any distance, the two batsmen run across and exchange wickets, and continue to do so as long as there is no risk in being "run out," that is, of having the stumps struck by the ball while they are out of their position near the wickets.

Each time the batsmen run between the wickets is counted as a "run" and is marked to the credit of the striker of the ball. If the batsman allows the ball to carry away a bail or a stump, if he knocks down any part of his own wicket, if any part of his person stops a ball that would have otherwise reached his wicket, or if he strikes a ball so that it is caught by one of the opposite party before it reaches the ground, he is "out," that is, he gives up his bat to one of his own side, and so the game goes on until all the men on one side have played and been put out. This constitutes what is called an "innings." The other side now take the bat and try to defend their wickets and make runs as their rivals did.

Usually two innings are played. The side scoring the greater number of runs wins.

CRIME, a wrong committed against a state, therefore an offense against all the people of the state. If a man is robbed, the security of the entire community is threatened, and all the people have common interest in punishing the guilty persons. There are different degrees in crime. The most heinous offense known to man is *treason*, which is an attempt to betray an entire nation to its enemies, or to give them even slight aid or comfort; *felony* is so serious an infraction of the law that punishment often extends to long periods of years and to the imposition of heavy fines. A *misdemeanor* is a minor offense.

See *Treason*; *Felony*; *Misdemeanor*, and the various crimes of magnitude such as Murder, Robbery, Larceny, Arson, Conspiracy, etc.

Criminology is that social science which conducts a scientific study of crime, in all its phases, with the hope of decreasing wrongdoing and reforming the wayward. The habits of criminals are studied; the machinery of justice is considered in its bearings upon reformation; methods employed in prisons and jails are investigated, to the end

that reform and not persecution and further hardening of moral sensibilities, may be accomplished. The subject has challenged the best thought of many people, and progress in checking evil tendencies is discernible.

CRIMEA, a peninsula of Southern Russia, between the Sea of Azov and the Black Sea, united to the mainland by the Isthmus of Perekop. It is about 200 miles long and 110 miles broad. Three-fourths of the Crimea belongs to the region of steppes, but the other part, confined entirely to the south and stretching along the coast from west to east, abounds in beautiful mountain scenery. Here the valleys are luxuriant with vines and olive and mulberry plantations, while the northern slope gives a large yield in cereals and fruits. The most important of the productions, besides those already mentioned, are flax, hemp and tobacco, of which a large quantity of excellent quality is produced. The forests are of limited extent. Fleece-wooled sheep, horned cattle and horses are reared in large numbers. The chief town and port is Sebastopol; population, 1933, 78,300.

The country was anciently associated with the Cimmerians and in later times with various Greek settlements and minor kingdoms. After being for some time a dependency on Rome, it was overrun by barbarians, and in 1237 it fell into the hands of the Mongols, under Genghis Khan. About 1261 the Genoese were permitted to occupy and fortify Kaffa, and they rapidly extended their power in the formation of other settlements. They were expelled, however, in 1475 by Mahomet II, who made it a dependent khanate. In 1783 the Russians took possession of the country; and with the view of overawing the Turks the great naval arsenal of Sebastopol, occupying the most commanding position on the Black Sea, was begun by Catharine II in 1786. Its military resources were steadily developed up to the time of the Anglo-French campaign (see **CRIMEAN WAR**) of 1854, when it fell into the hands of the allies, by whom it was held until March, 1856. It was then restored to Russia.

After the World War, in 1921, the Crimean region declared its independence, and established a republican rule. It was later federated with the Soviet Union as one of the autonomous republics of Soviet Russia.

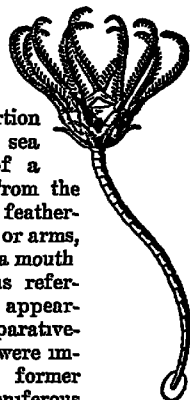
CRIMEAN WAR, the struggle caused by the attempt of the allied powers of England,

France and Turkey to prevent the aggressions of Russia in Turkey. The old plans for the extension of Russian power conceived by Catharine II were revived by Nicholas I, who, believing that he had secured himself from interference on the part of Austria and Prussia, and that an Anglo-French alliance was impossible, prepared to carry them out. Serbia, Bosnia, Bulgaria and the principalities of the Danube were to become protectorates, and Constantinople was to be provisionally occupied by Russian troops. However, the first markedly aggressive step, the demand by Russia for a protectorate over the Greek Church throughout the Turkish Empire, brought matters to a crisis. After a vain attempt to negotiate, the Russians occupied the Danubian principalities, and war was declared by Turkey in October, 1853, by France and England in 1854 and by Sardinia in 1855.

It soon became obvious that the Crimea must be the seat of the war, and the allied troops landed there in September, 1854. Five days after their arrival the Battle of Alma was won by the allies, and the march was then continued toward Sebastopol. The siege of Sebastopol was begun in October by a grand attack which proved a failure, and the Russians retaliated by attacking the English at Balaklava (October 25), but were defeated with heavy loss. It was at this battle that the famous, but useless, charge was made by the Light Brigade.

A second attack at Inkermann was again repulsed by the allies, but the siege works made slow progress during the winter, during which the ill-supplied troops suffered great privations. The death of Nicholas and the succession of Alexander II, in March, 1855, brought no change of policy. The bombardment was continued, and in September the French successfully stormed those parts of the fortifications known as the Malakoff and the Little Redan. The Russians then withdrew from the city to the north forts and the allies took possession. The chief subsequent event was the capture of Kars, in Asia, by the Russians, after a splendid defense by the Turks. By this time, however, the allies had possession of the Crimea, and overtures of peace were gladly accepted. A treaty was accordingly concluded at Paris in March, 1856, by which the independence of the Ottoman Empire was guaranteed.

CRINOIDEA, *krí noi' de ah*, or **SEA LILIES**, a group of sea animals, consisting of creatures which are attached during the whole or a portion of their lives to the sea bottom by means of a jointed, stony stem. From the tip of this stem radiate feather-like, flexible appendages or arms, in the center of which is a mouth. Their popular name has reference to their flowerlike appearance. Though now comparatively few in number, they were immensely numerous in former ages, and many carboniferous limestones are almost entirely made up of the stems, which break apart into circular sections. See ECHINODERMATA.



ONE OF THE LIVING CRINOIDEA

CRINOLINE, *krín' o lín*, originally, a stiff, wiry fabric, made of horsehair and used by women for petticoats, to make their dress skirts stand out from the figure. Later, the same name was applied to the hoop skirt, an article made of steel wire and tapes and used for the same purpose as the crinoline. Modern crinoline is a cotton gauze, dressed with glue. It is used for stiffening garments and as a material for hat frames.

CRIPPLE CREEK, COLO. founded in 1890 in the midst of a rich gold-mining section, is the county seat of Teller County, about thirty miles southwest of Colorado Springs, on the Colorado Midland railroad. During the time of its greatest prosperity two other railroads connected it with the larger cities. The industries largely center around the gold mines, which have yielded over \$700,000,000 of ore, thousands of men are employed in the district. The town was burned in 1896 and was at once rebuilt. Rise of the price of gold in 1935 gave renewed prosperity to the city. Population, 1920, 2,325, in 1930, 1,427, in 1936, 2,300.

CRITTENDEN COMPROMISE, a proposal introduced in the United States Senate in 1860 by Senator John Crittenden for the passage of an amendment to the Constitution, which would divide the Union into two sections, one composed of free states and one of slave states, the boundary line being the latitude of 36° 30'. The Federal government was not to have the power to abolish slavery

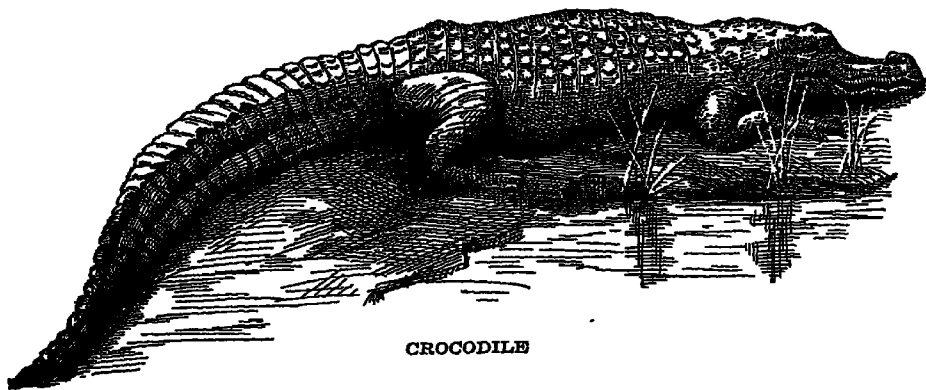
in the District of Columbia, nor to prohibit the interstate slave trade, nor to abolish slavery in a slave state. It was lost in the Senate on March 2, 1861, by a vote of 20 to 19, and in the House, January 14, 1861, by a vote of 113 to 80.

John Jordan Crittenden (1787-1863) the author of the Crittenden Compromise, was a native of Kentucky. He was graduated at William and Mary College served in the War of 1812, in the state legislature, in the United States Senate, several times as attorney general and finally as governor of Kentucky. Largely through his influence the state of Kentucky maintained its adherence to the Union.

CROATIA, *kro a'she a*, and **SLAVONIA**, *sla vo'ni a*, formerly a crownland of the kingdom of Hungary, one of the two main divisions of the former Austro-Hungarian monarchy. In 1918, on the dissolution of Austria-Hungary, the people of Croatia and Slavonia

were estimated at 2,603,633 in 1931.

CROCK'ETT, DAVID (1786-1836), a famous American frontiersman, soldier and politician, born in Tennessee. His early training was that of the typical wild frontier of the early nineteenth century. He received little or no education, but had native shrewdness and wit and by an outdoor life he became a remarkably skilful hunter. He took part in the war against the Creek Indians, serving under General Andrew Jackson, and was three times elected to Congress, where he attracted attention by his eccentricity of manner and dress. Soon after retiring from Congress, he took up arms with the Texans in their war for independence, and at the Alamo in 1836 he was one of the six survivors of the siege who were captured and massacred by the Mexicans. He published during his lifetime, several books of travel and adventure, among which were *A Narrative of the Life of David Crockett*, *A Tour to the North*



CROCODILE

joined with various other southern Slavic peoples and formed the new Jugo-Slavic nation (see JUGO-SLAVIA). Agram, the capital city of Croatia and Slavonia, was made the headquarters of the national council of the new state.

According to the old boundaries, Croatia is the larger and western portion of the crownland, and Slavonia, lying between Hungary proper and Bosnia, is the eastern. The crownland is separated by the Drave and the Danube from Hungary proper, on the north-east, and by the Save from Serbia and Bosnia, on the south. Dalmatia and the Adriatic Sea are on the southwest, and Styria, Carniola and Istria are on the west. The total area is 16,425 square miles; the popula-

and Down East and *Exploits and Adventures in Texas*. They were all characterized by atrocious grammar and crude and often coarse humor, but they displayed the same untrained common sense which he exhibited in his eventful career.

CROCODILE, *krock'o dîle*, the most highly-developed reptile, allied to the alligator. These two reptiles differ in that the crocodile has a narrower head than the alligator, and a sharper snout. Its tail is also more vertically flattened, and it is more agile and lighter in weight than the alligator. The true crocodile inhabits the warm regions of the eastern hemisphere, though some species are found in North and South America. The crocodile of the Nile is one of the best known

members of the family In olden times this animal was worshiped by the Egyptians, who preserved the bodies of crocodiles with almost as great care as the bodies of human beings The natives of Southern Asia and the Moluccas fear the species common there, because of its fondness for human flesh. The skin and flesh of the crocodiles form articles of commerce of considerable importance, the tough skin making a durable and valuable leather. See ALLIGATOR; GAVIAL.

Crocodile Bird, a bird of the plover family, found in the Nile Valley, so called because it has the habit of running over the bodies of crocodiles in search of food. The birds feed on insects and shellfish which cling to the sides of the crocodiles, and they even take parasites and bits of food from their lips and gums.

CROCUS, *kro'kus*, a genus of plants of the Iris family, one of the most common ornaments of spring gardens. Most of the species are natives of the south of Europe and Asia Minor, and three grow wild in Britain The early spring flowers appear as soon as the snow has left the ground, even before their leaves. They are of a great variety of colors, and unless the winters are very cold, will grow from year to year.

CROESUS, *kro'esus*, the last king of Lydia, who lived in the sixth century B. C. His riches, obtained chiefly from mines and the gold dust of the River Pactolus, were greater than those of any king before him, so that his wealth became proverbial After a reign of fourteen years his empire fell to the possession of Persia.

CROIX DE GUERRE, *krahv de gare*, the French for "cross of war," is the name of a French military decoration instituted by law of April 8, 1915 The Croix de Guerre is made of Florentine bronze It consists of four branches, among which are two crossed swords On the reverse side the center represents a head of the republic bearing a Phrygian bonnet, ornamented by a laurel crown on which is engraved "French Republic" On the other side is the inscription

"1914-1915, 1914-1916," etc. The cross is worn on the left side of the breast immediately after the Legion of Honor or the Military Medal, and is fastened to a green ribbon having a red edge on each border and five red bands parallel with the edges.

This decoration was instituted to commemorate, from the beginning of the World War, special acts of bravery. It was conferred on military men of the armies on land or sea, whether French or foreigners, who obtained certain citations for bravery during the war against Germany. Civilians and members of the different military personnels also received the cross if they obtained one of the citations Citations are distinguished in the following way:

Army a palm of bronze in the form of a laurel branch
Army Corps a silver-gilt star.
Division a silver star.
Brigade regiment or assimilated unit, a bronze star

Several citations obtained for various acts of bravery are distinguished by the number of stars corresponding to their degree, or by palms The disposal of the palms being difficult on the ribbon when the number of palms exceeds five, for the fifth palm a silver palm replaces on the ribbon of the Croix de Guerre the five bronze palms. When the citation was given to a corps the Croix de Guerre was attached to the flag or standards of the corps.

CROMWELL, OLIVER (1599-1658), one of the great characters in English history, the leading figure in the revolution that dethroned Charles I. Cromwell was born at Huntingdon and educated at Sidney-Sussex College, Cambridge. He married Elizabeth, daughter of Sir James Bourchier, and for some years after his marriage he lived on his estate in Huntingdon. In 1628 he was member of Parliament, but he seems to have made no pronounced impression on that body at that time. In 1631 he went with his family to a farm which he had taken at Saint Ives: and some years later he removed to Ely



CROIX DE GUERRE



CROCUS

where he had inherited a property. He was again elected to Parliament in 1640 and took part in its deliberations on all important topics, without, however, becoming very prominent.

About this time the struggle between Parliament and the king was becoming acute, and the summer of 1642 found Cromwell, who was naturally a warrior, actively engaged in raising and drilling volunteers for the Parliamentary party. He served as captain and colonel in the earlier part of the civil war, distinguishing himself through his disciplinary powers and the well-drilled character of his troops. When the



OLIVER CROMWELL

army was reorganized and, through the "self-denying" ordinance, all members of Parliament were excluded from commands, an exception was made in favor of Cromwell, who kept his command of the cavalry. On the occasion of the surrender of Charles by the Scottish army in 1646, Cromwell was one of the commissioners, and in the distribution of rewards for services he received \$12,500 a year from the estates of the Marquis of Worcester. Affairs in Ireland demanding his presence, he was appointed lord-lieutenant and commander in chief; and by making a terrible example of Drogheda, he crushed the royalist party in that country within six months. Resigning the command of Ireton, he undertook, at the request of the Parliament, a similar expedition against Scotland, where Charles II had been proclaimed king. He saved himself from almost inevitable disaster by the splendid victory at Dunbar, and a year later he put an end to the struggle by his total defeat of the royalists at Worcester.

The Rump Parliament, as the remnant of the Long Parliament was called, had become worse than useless, and in April, 1653, Cromwell, with his soldiers, dispersed that body. He then summoned a council of state, consisting mainly of his principal officers, which finally chose a Parliament of persons selected from the three kingdoms, nicknamed *Barebones Parliament*, or the *Little Parliament*. Fifteen months later a new annual Parliament

was chosen; but Cromwell soon prevailed on this body, which was totally incapable of governing, to place the charge of the Commonwealth in his hands. The chief power now devolving again upon the council of officers, they declared Oliver Cromwell sole governor of the Commonwealth under the name of Lord Protector. Although practically absolute, Cromwell's government was wise and moderate, and restored England in the eyes of other nations to the position of dignity which had been lost. He made the nation respected and feared throughout Europe, and he maintained order at home until his death, in 1658. In 1899 Parliament erected a statue in his honor in Westminster, facing Whitehall.

Related Articles. Consult the following titles for additional information:

Charles I	Long Parliament
Charles II	Naseby, Battle of
Commonwealth of England (History)	Restoration
	Rump Parliament

CROMWELL, THOMAS, Earl of Essex (about 1490-1540), an English statesman who was one of the most pliant servants of Henry VIII. The king was much impressed by Cromwell's able defense of Cardinal Wolsey, in a case of impeachment tried in Parliament, and made him his private secretary. From this position Cromwell rose to be Chancellor of the Exchequer, Lord of the Privy Seal and Earl of Essex. Cromwell's subserviency, however, eventually caused his downfall. Having vigorously promoted the marriage of Henry and his third wife, Anne of Cleves, he fell under his master's displeasure when that tyrant tired of his wife, and accordingly Henry permitted the Earl to be tried for treason. At the height of his career, Cromwell was condemned and beheaded. Because of his vigorous efforts to suppress the monasteries, he was called "Hammer of the Monks." See **HENRY VIII.**

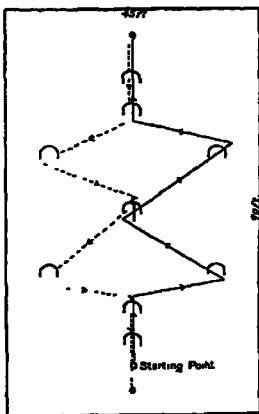
CROOKES, WILLIAM, Sir (1832-1919), one of England's most honored scientists, was born in London and educated at the Royal College of Chemistry. He began his career as superintendent of the meteorological department of Radcliffe Observatory and then became professor of chemistry at the Chester Training College. Professor Crookes occupied a foremost place among scientific men and was considered highest authority on the application of the principles and laws of chemistry to the industrial art

and on sanitary matters. Also he gave much attention to the relation of chemistry to various lines of industry, and among his discoveries is the sodium amalgam process for separating gold and silver from their ores and a special method for the study of substances through the spectroscope. His experiments in electricity led to the invention of Crookes tubes (see CROOKES TUBES), so generally used in electrical experiments. Among his most widely known works are *A Practical Handbook of Dyeing and Calico Printing*, *Select Methods of Chemical Analysis*, *Dyeing and Tissue Printing*, *A Solution of the Sewage Question*; *The Profitable Disposal of Sewage*, *The Wheat Problem and Diamonds*.

CROOKES TUBES, glass tubes or vessels from which the air has been exhausted and which contain electrodes at opposite ends. These tubes are used in electricity to secure various effects of electrical discharge, and are indispensable in the making of apparatus to produce X-rays. They take their name from the inventor, Sir William Crookes (which see).

Geissler tubes, invented by Geissler, are of a similar pattern. When used in connection with an induction coil and an electrical machine in the dark room, these tubes produce many beautiful luminous effects. A peculiar pattern of them is also used in the production of cathode rays (which see).

CROQUET, *kro ka'*, an open-air game, in which two or more persons with long or short-handled mallets endeavor to drive balls through a series of nine or ten wire arches (*wickets*) set in the ground in a certain arrangement. In the accompanying figure the wickets are set in the most common way. A croquet set consists of eight balls, painted to correspond with eight



CROQUET GROUND

mallets; two stakes, with bands to match the colored balls in the same order on each, and ten wickets. The object of the game is to start from one stake, drive the ball through the arches on one side, touch the lower stake and return through the arches of the other side to the starting stake (see the diagram). If two people play, each may use two balls; but when four play, each has but one ball. The players play alternately, and the side first completing the circuit wins the game. Special rules are formulated to cover emergencies, and a number of technical terms are in general use. A *rover*, for instance, is a ball that has made the circuit of the field but has not finally touched the starting stake; such a ball may play upon every other ball in the field in one turn. A *dead ball* is one that has been played upon since a point was made.

CROSBY, *kraws'bi*, FANNY (1820-1915), a blind hymn writer, whose influence in this field has been second only to that of Charles Wesley. She was born at Southeast, N. Y. At the age of six weeks she became blind through the application of a hot poultice to her eyes, but this affliction seems only to have intensified her deep religious feelings in after life. At the age of fifteen she became a pupil at the New York Institution for the Blind, and during twelve years of residence there she displayed a marked aptitude for verse form. In 1847 Miss Crosby became a teacher in the Institution, and in 1858 she married a blind musician Alexander Van Alstyne. Of more than 7,000 hymns from her pen, the best known include *Safe in the Arms of Jesus*, her favorite; *Pass Me Not, Jesus is Calling*, *I am Thine*, *Blessed Assurance*, *Rescue the Perishing*, and *Close to Thee There's Music in the Air* is the best known of her secular songs. She also published two volumes of poems and an autobiography, *Memories of Eighty Years*.

CROSS, one straight body laid at any angle across another. Among the ancients a piece of wood fastened across a tree or upright post formed a cross, on which were executed criminals of the worst class. It had, therefore, a place similar to that of the modern gallows as an instrument of punishment until, from the crucifixion of Christ, it came to be regarded by Christians with veneration. The Church adopted it as the peculiar symbol of the Christian religion.

and it is still, especially in the Roman Catholic Church, paid peculiar honors.

The cross on which Christ died consisted of a long upright and a shorter crosspiece, the latter fastened on at right angles. This form is the so-called *Latin* cross. The *Greek* cross, represented by the cross of Saint George, has four arms of almost the same length, forming four right angles; in *Saint Andrew's* cross the arms cross obliquely. These two forms are blended together in the British Union Jack. Another form is the *Maltese* cross, with eight pointed ends.

CROSS, MARY ANN or MARIAN. See ELIOT, GEORGE.

CROSSBILL, a species of finch. The two mandibles are so strongly curved that the upper crosses the lower one when the bill is closed. These crossed bills are used with great power to tear pine cones to pieces for the seed which they contain. The crossbills can tear wood readily and soon destroy a wooden cage if confined in it. The male is reddish in color, and the female is of a yellowish-green. But few species are known in the United States, and these are confined almost wholly to the pine forests. One fanciful legend says that the bill of the bird was



AMERICAN CROSSBILL

crossed in trying to draw the nails from the hands of Christ when He was crucified.

CROSS FERTILIZATION, fertilization by which the pollen from the stamens of one

plant is conveyed to the pistils of another. This is accomplished by the agency of wind and water and by the aid of insects or birds. The effect of this process is that better seeds, that is, those which produce stronger and more fruitful plants, are produced. Botanists have found many special adaptations by means of which cross fertilization is effected. If, for instance, the anther and stigmas become mature at different times on the same plant, it is clear that the stigma can be fertilized only by the pollen of another plant; if the stigma and anthers are so placed that the pollen cannot fall on the stigma, it may fall on some insect which will carry it to another flower; again, in case the stigmas are borne on one plant and the pistils on another, the wind or some other agency must carry the pollen. More complex modes are also common. The stamens of the barberry are very sensitive and when touched by an insect, throw the pollen upon the pistil. Some plants, such as mints, are provided with levers, by means of which the pistil is thrust forward upon the insect previously dusted by the pollen. The pollen is sticky in some plants and adheres to the tongue of the insect. Some plants, like the orchids, are provided with traps, which catch the insects by the limbs and thus force them to scatter the pollen.

Birds, as well as insects, aid flowers in distributing their pollen. Birds that feed on the nectar become dusted with pollen, which in their passage they scatter upon other pistils. Hummingbirds are especially active in performing this service.

The term *cross fertilization* is also used in a general sense and applied in the cases of animals and the human race. A limited amount of cross fertilization, if the environment and other conditions are only slightly changed, is beneficial, but crosses between individuals which are too different in constitution and habits are usually detrimental. Mingling of species too closely related is also usually to the disadvantage of the offspring.

CROTON, a genus of plants, either herbs, shrubs or trees, which are widely distributed and bear rather small flowers in terminal clusters. Many species are aromatic, and rich perfumes are made from some, while others yield important medicines. The species which grow in the United States are not especially valuable, but the seeds of a species found in the Philippines yield a powerful oil, prescribed for constipation.

CROTON AQUEDUCT, *kro'ton ak'we dukt*, a system of aqueducts which helps supply New York City people with water. The source of supply is Croton Lake, created by the construction of a dam across the Croton River. The original aqueduct was completed in 1842. It is 38 1 miles long, has a total fall of 43.7 feet, and is constructed of stone, brick and cement. The water is taken across Harlem River in three cast-iron pipes, which are supported on a bridge 100 feet high and about 1,400 feet long. This aqueduct was designed to carry seventy-two million gallons a day, but it was soon found too small to supply the needs of the city. A second aqueduct was completed in 1890, extending from Croton Lake to 135th Street, New York. It is about thirty-one miles long, nearly thirty miles of which are a horse-shoe-shaped tunnel thirteen and a half feet square. The new aqueduct crosses the Harlem River by an inverted siphon, which is 300 feet below the river bed. Its capacity is over 300 million gallons a day. It is connected with the Jerome Park storage reservoir, about twenty-three miles from the dam. For six miles from this point the section is circular and twelve and one-half feet in diameter, having its capacity reduced to 250 million gallons.

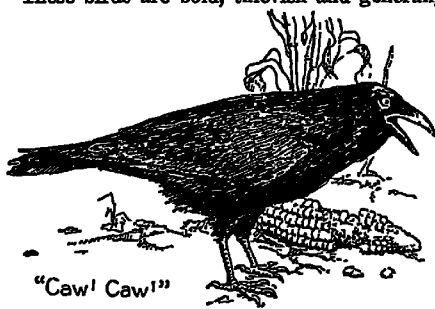
Since the Croton aqueduct was completed, the demand for still greater supplies of water for the city led to the building of the Catskill aqueduct. This furnishes 250,000,000 gallons a day, and was completed in 1913. The water is carried nearly a hundred miles, from the Catskill Mountains. Later additions have doubled the original supply, to meet the needs of a growing population.

CROUP, *kroop*, a disease, usually attacking children only, which appears in the form of a hoarse cough, accompanied by difficult breathing and the appearance of suffocation. It usually occurs in the night and may be repeated, each attack lasting several hours and terminating in some fever. Sometimes, in the case of ill-nourished or feeble children, the disease is fatal. Inhaling warm vapors of water will often relieve the difficulty, but in severe cases a physician should be called. The child may be given warm milk to drink frequently, and doses of syrup of ipecac to bring on vomiting. The latter should be administered at the rate of a half-teaspoonful every fifteen minutes.

A second variety of the disease is known

as *membranous croup*, which is diphtheria of the larynx and is caused by the same bacillus that is active in diphtheria. In *false croup*, as the first species is known, nothing is coughed up, but in membranous croup pieces of membrane are expelled. Death may come from convulsions or from suffocation, though frequently the latter is prevented by the operation known as tracheotomy, in which a tube is inserted into the windpipe below the inflamed tract. Through this tube the patient breathes. Membranous croup demands the attention of a reliable physician. See **DIPHTHERIA**.

CROW, one of a family of birds containing about 200 species, found in nearly all parts of the world. The North American crow is about eighteen inches in length and has a compact, glossy plumage with some greenish reflections. The crows are social birds that sometimes gather in large flocks, are readily domesticated and sometimes are taught to imitate human speech. They make amusing pets and sometimes show an almost human intelligence, but they are mischievous and seem to take pleasure in annoying people. These birds are bold, thievish and generally



THE CROW

unpopular. A tame crow is as great a thief as is a wild one, and will carry off any bright trinket it can find. Opinions vary as to the right of the crow to protection. It surely destroys countless injurious insects, but it uproots newly-planted corn and seeks birds' eggs and young, helpless birds, also the eggs of poultry.

All are birds of strong flight, and all move along the ground by hopping, though most of them can run also. The *fish crow* is a rather small species, very common in the eastern United States. The magpies, jacksnaws, rooks, jays and ravens are closely

related species, described under their proper titles.

CROW, a tribe of Indians, now living on a reservation in Montana. Originally a very warlike race, they sided with the whites against the Sioux and often proved of great assistance, especially as scouts. The Crow tribe lived originally in the valley of the Big Horn River. Their women were skilled in the making of ornamented garments. They now number about 1,800.

CROW BLACKBIRD, or **PURPLE GRACKLE**, a large, handsome black bird, found in the eastern parts of America from Southern Canada to the Gulf of Mexico. It is about a foot long, with glossy jet-black color and fine greenish and metallic reflections. West of the Allegheny Mountains its representative is the very similar bronze grackle.

CROWN, a coin, of which the English crown is best known. The latter is equivalent to five English shillings, or about \$1.22 in United States money. It was originally made of gold, but since 1551 it has been issued in silver. It bears the imprint of a crown on one side and a likeness of the ruling sovereign on the other. The crown weighs 436.3636 troy grains, of which .925 is pure silver. The name is also used to designate the monetary unit of certain other countries, and these are named in the article **COINS, FOREIGN**.

CROWN, a symbol of kingly authority, in form circular, to fit the head, made of gold and embellished with precious stones. It is worn on state occasions only. The modern crown is an evolution of the jeweled head-dress of Assyrian and Egyptian monarchs. A number of modern crowns are fabulously valuable, particularly some of those belonging to the reigning native princes of British provinces in India. They are set with scores of precious stones. The crown and jewels of the king of England are valued at about \$1,000,000.

CROWN POINT, a town in Essex County, N. Y., chiefly important for its historical associations. It was early the site of an English trading post, was settled by the French in 1731, but was destroyed in 1759 by a British attacking party. At the outbreak of the Revolution a body of Green Mountain Boys, under Seth Warner, surprised and captured the garrison, and it was held by the Americans until Burgoyne's invasion in 1777, when it was temporarily abandoned. The ruin of the fortifications erected at this point by the Brit-

ish after 1759, at a cost of more than \$10,000,000, may still be seen.

Crown Point is 110 miles northeast of Albany and ten miles from Ticonderoga, on the west shore of Lake Champlain and on the Delaware & Hudson railroad. It has small manufactures of lumber and allied products. Population, about 1,500.

CRUCIFERAE, *teru sif'ur ee*. See **MUS-TARD FAMILY**.

CRUCIFIXION, **THE** (in art). The portrayal of the martyrdom of Christ has been a favorite subject of numerous artists. After the sixth century canvases on this theme became very popular, and it is an interesting fact that the earlier painters usually represented a living Christ with a crown of triumph, while those after the twelfth century depicted the Master as suffering and humiliated. Many other figures are grouped about the cross by the later artists, including the mother of Christ, Mary Magdalene and Saint John. The famous paintings of the Crucifixion include canvases by Fra Angelico, Perugino, Guido Reni, Tintoretto, Dürer, Rubens, Van Dyck and Murillo. See **PAINTING**.

CRUELTY TO ANIMALS, **SOCIETY FOR THE PREVENTION OF**. The first society for this purpose was organized in England in 1824, and it was soon influential in securing legislation which provided for the punishment of the beating or otherwise ill-treating of domestic animals, with fine or imprisonment. The first society in the United States was organized in New York in 1866, through the influence of Mr. Henry Bergh, who, during his lifetime, was the most active representative of the society and the idea for which it stood. Through the influence of this organization, legislation has been secured in nearly every state in the Union, fixing a penalty of fine or imprisonment, or both, for abusing domestic animals. Legislation on the subject also regulates transportation of live stock in those sections where stock is carried long distances before reaching market. Railways are now required to unload animals every twenty-four hours and give them rest, feed and water. This humane movement has extended practically to all civilized countries, and in some sections there are laws regulating the treatment of wild animals in captivity.

Henry Bergh (1820-1888) was born in New York City and was educated at Columbia College. Before he began the work for

which his name is universally honored he served in the American legation at the capital of Russia. Bergh also invented artificial pigeons for the sportsman's gun, and was the originator of the plan whereby ambulances are used to carry injured animals away from the streets.

CRUELTY TO CHILDREN, PREVENTION OF, a movement for the protection of children from brutal treatment. The first formal organization in America for child protection was founded in New York in 1875 through the influence of Henry Bergh; others followed rapidly, and at the present time there are more than 350 such societies in the United States. These organizations work for legislation beneficial to children, they help enforce laws already enacted, and they bring before the proper authorities cases of neglect or ill treatment. Many of them include in their activities both the protection of children and of animals.

Some of these societies are financed and controlled by private individuals, and others have official relations with the state authorities. In Europe, Canada and other British colonies similar organizations are found in large numbers



CRUSADES, *krus sayds'* (from the Latin word meaning *cross*), the wars carried on by the Christian nations of Western Europe, from the eleventh to the thirteenth century, for the conquest of Palestine, and delivery of the Holy Land from the infidel Turks. They were given the name of Crusaders because the warriors wore the sign of the Cross. The antagonism between the Christian and Mohammedan

nations had been intensified by the treatment the Turks accorded pilgrims to Jerusalem, and the first strenuous appeal to wrest the Holy Land was assured of response alike from the pious, the adventurous and the greedy.

The First Crusade. The immediate cause of the first Crusade was the preaching of Peter the Hermit, who had joined other pilgrims on a journey to Jerusalem. On his return he gave Pope Urban II a description of the unhappy situation of Christians in the East and

presented a petition for assistance from the patriarch of Jerusalem. The statements of the pope at the Council of Clermont in 1095 produced a profound sensation throughout Europe, and in 1096 several armies set out in different divisions. Most of these earliest crusaders, ignorant as they were of military discipline and not provided with sufficient food, perished before reaching Constantinople, which had been chosen for their place of meeting. A well-conducted regular army, however, of almost one hundred thousand knights, was headed by such men as Godfrey of Bouillon, Baldwin, brother of Godfrey, Robert of Flanders, Robert of Normandy, brother of William II, king of England, Raymond of Toulouse, and other heroes. They traversed Germany, Hungary and the Byzantine Empire, passed over into Asia Minor, conquered Nicaea in 1097, and shortly after fought the first pitched battle at Dorylaeum, winning a complete victory after a severe contest. They then marched upon Antioch, which fell into their hands in June, 1098. Surrounded in turn by a Turkish army, they were soon reduced to pitiable straits but succeeded in routing their besiegers, and after remaining nearly a year in the neighborhood of Antioch they began their march against Jerusalem. Their numbers were now reduced to little more than twenty thousand men, but after a fierce struggle the town was taken by storm (1099) and Godfrey of Bouillon was chosen ruler of the city (See Godfrey de Bouillon).

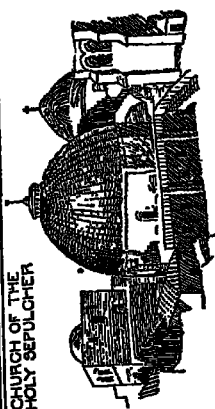
The Second Crusade (1147-1149) was occasioned by the loss of Edessa, which had been taken by the Christians in the First Crusade. Fearing still graver losses, the pope, seconded by Bernard of Clairvaux, exhorted the German emperor Conrad III, and the king of France, Louis VII, to defend the cross. Both these monarchs obeyed and led large forces to the East, but returned without accomplishing anything.

The Third Crusade was undertaken after the capture of Jerusalem by Saladin in 1187, the monarchs Frederick Barbarossa of Germany, Philip Augustus of France and Richard I of England, leading their armies in person. Richard and Philip Augustus agreed to unite their forces at Messina in Sicily, where they spent six months at the end of 1190 and beginning of 1191. Jealousies arose, however, between the monarchs, and within a few weeks after the fall of Acre the French king returned to Europe. Richard, now sole leader of the expedition, defeated Saladin, but having twice vainly set out with the design of besieging Jerusalem, he finally concluded a truce of three years and three months with Saladin, who agreed that pilgrims should be free to visit the Holy Sepulcher, and that the whole seacoast from Tyre to Jaffa should belong to the Crusaders.

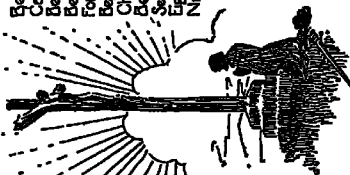
The Fourth Crusade was set on foot by Pope Innocent III in 1202. Among its chief promoters were Geoffrey of Villehardouin, Baldwin of Flanders and the marquis of Montferrat, who was chosen leader. The

THE CRUSADES

CHURCH OF THE HOLY SEPULCHER



LANDING OF ST. LOUIS



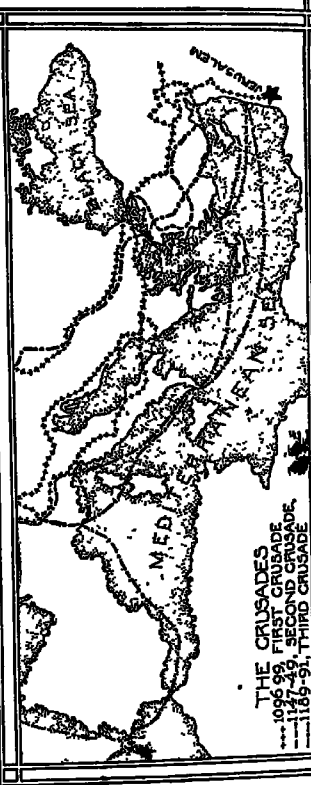
A PILGRIM AT THE SHRINE ON THE ROUTE



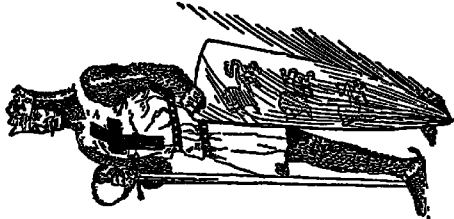
THE SPIRIT OF THE CRUSADES



PETER THE HERMIT



THE CRUSADES
1096-99, FIRST CRUSADE
1147-49, SECOND CRUSADE
1189-91, THIRD CRUSADE



RICHARD "THE LIONHEARTED" AS A CRUSAADER

SUMMARY

Beginning of First Crusade	1096
Capture of Jerusalem	1099
Beginning of Second Crusade	1147
Beginning of Third Crusade	1189
Fourth Crusade begun by Knights of St. John	1193
Beginning of Fifth Crusade	1201
Children's Crusade	1212
Beginning of Sixth Crusade	1217
Seventh Crusade preached by Richard of Cornwall	1248
Eighth Crusade undertaken by St. Louis	1248
Ninth Crusade	1267

Crusaders assembled at Venice in the spring, but were diverted from their original purpose, first by the capture of the Dalmatian town of Zara, and then by the expedition which ended in the sack of Constantinople and the establishment of a Latin empire there (1204).

The Fifth Crusade (1228-1229), that of Frederick II, emperor of Germany, was undertaken in fulfillment of a vow. Frederick entered into negotiations with the sultan of Egypt, and without any fighting gained possession of the kingdom of Judea on the condition of tolerating in his kingdom the Mohammedan worship. He then concluded a useless truce of ten years and was crowned at Jerusalem.

The Sixth (1248-1254) and Seventh (1270) Crusades were led by Louis IX of France. In the first of these expeditions he took Damietta and marched up the Nile, but was compelled to retreat and finally to surrender with his whole army. He was released only on payment of a large ransom. The second expedition was still more disastrous in its results than the first. He landed his army on the northern coast of Africa, but he himself and a large number of his knights died before Tunis. A crusading army under Prince Edward of England (later Edward I), originally intended to cooperate with that of Louis, landed at Acre in 1271, but little was effected beyond a new truce for ten years.

The Children's Crusade. Authorities do not all agree as to the numbering of these Crusades, as there were in the intervals between the greater movements constant minor expeditions. Most remarkable of these lesser crusades was the Children's Crusade in 1212. It is believed that about fifty thousand boys and girls took part in this movement. A band of German children marched south to the Mediterranean and although thousands of them died of privation by the way, the remainder pressed on, confident that a way would be opened to them through the sea. When their hopes proved false, some of them remained in Genoa and some attempted to return to Germany, but few of them ever arrived at home. The French children gathered at Marseilles, and two merchants managed to entice them on board ship, with the promise of free transportation to the Holy Land. Two of the ships were wrecked and the children on the others were sold in Alexandria as slaves.

Despite the fact that the Crusades failed entirely in their real object, they were of inestimable importance in European history for many reasons. The European nations became better acquainted with one another; the power of the Church was materially increased; the citizen class gained much influence, partly because the nobility suffered by extravagant contributions to the Crusades, and partly because the enlarged commercial intercourse greatly augmented the

wealth of the cities. Another important political result of the Crusades was the growth of the royal power at the expense of that of the nobles. Intellectually the Crusades were of the utmost value, because they brought to the notice of Europeans the civilization of the Saracens, which was much higher in many respects than that of any of the western nations.

CRUSTACEA, *krus to'she ah*, the highest group of jointed animals. There are about 10,000 living species, the majority of them being sea animals, though a few are found upon the earth or in stagnant or running fresh waters. The smaller ones are an important source of food to other marine animals, while some of the larger types are among the favorite sea foods of all nations. Crustaceans have five pairs of appendages on the head, and all of their limbs excepting the first pair are forked. The entire body is covered with a hard coating, which in some forms is almost bone-like, but in others is merely tough and leathery. The animals lay eggs, which are almost always hatched in water, though some of the land species carry the eggs and young on the under side of the abdomen. As the animal grows its skin becomes confining at intervals, and so it is cast off, together with the shell which it has secreted.

Related Articles. Consult the following titles for additional information.

Arthropoda	Lobster
Barnacle	Shrimp
Crab	Zoology

CRYOLITE, or **KRYOLITE**, a mineral, a native fluoride of aluminum and sodium, found at Evigtok, in Greenland, whence it is exported. It is of a pale grayish-white or yellowish-brown color, with a glassy lustre, and occurs in masses of thin layers folded upon one another. It has been employed as a source of aluminum, and in the manufacture of a hard, porcelainlike glass of great beauty.

CRYPT, *krypt*, a vault under a church, designed originally to receive the bodies of the saints and martyrs. It developed out of the *confession* and became enlarged so as to contain the altar and a room to worship relics. It generally occupied the space below the transept, choir and apse. From the ninth to the thirteenth century the crypt formed an important feature of church architecture, particularly in the Romanesque style. One of the famous examples is that under the

Glasgow Cathedral, and others are found in the cathedrals of Canterbury, Gloucester and Saint Mark's and in the Church of Saint Peter's. See ALTAR.

CRYPTOGAMOUS, *krip toh' ga mus*, **PLANTS**, or **CRYPTOGAMS**, *krip' toh-gams*, a term that includes all plants which do not bear seeds. In contrast with these, the seed-bearing plants are often called phanerogams. See BOTANY.

CRYSTALLINE, *kris'tal line*, or *kris'tal-in*, **LENS**. See EYE.

CRYSTALLINE ROCKS, rocks formed by crystallization, such as granite, believed to have acquired this character by the action of heat and pressure. See IGNEOUS ROCKS.

CRYSTALLIZATION, *kris tal i sa'shun*, a method of formation peculiar to many solid substances, whereby they are formed into masses of crystals. The forms thus produced are numbered by the thousands, but these can all be classified under six systems, as follows:

1. **The Regular Cubic System.** Crystals of this system have three lines or axes of equal length, crossing each other at the middle point at right angles. The ends of the axes lie in the center of the respective planes of the crystal. The regular crystals of this system are cubical. Common salt, iron pyrites, galena or lead sulphide, silver, copper and gold are examples of substances crystallizing on this plan.

2. **The Square Prismatic System.** In this system the axes are at right angles to each other, but one may be longer than the other two. The short axes may terminate in the middle of the planes of the crystal or at the edges of these planes, and the long axis may terminate in a point where all the faces meet. This arrangement forms a pyramid, or the crystal may have the form of two pyramids, with their bases together. Binoxide of tin, calomel and yellow prussiate of potash are common examples of this form of crystals.

3. **The Right Prismatic System.** In this the three axes are all of unequal length, but are placed at right angles to each other. The crystals belonging to this system are of the form of right rhombic prisms and rhombic-based octahedrons. Sulphate of Potash, sulphur, nitrate of potash and topaz crystallize on this plan.

4. **The Oblique Prismatic System**, in which two of the axes are placed at right angles to each other, while the third is inclined. The axes may all be of different lengths. The crystals take the form of oblique prisms. Borax, copperas (sulphate of iron), sulphate of soda and carbonate of soda (sal soda) are common examples.

5. **The Double Oblique Prismatic System.** A crystal in this plan has three axes of unequal length, intersecting obliquely with

each other. The crystals of this system are often irregular and difficult to classify. Blue vitriol (sulphate of copper), sulphate of manganese and some forms of tartaric acid crystallize according to this plan.

6. **The Hexagonal Rhombohedral System.** This system has four axes, three of which are in the same plane and inclined to each other at an angle of sixty degrees, while the fourth is perpendicular to them. This system gives a regular six-sided prism. Many varieties of limestone crystallize according to this plan, and some of the crystals are so minute that they cannot be seen without a microscope. Quartz, ice, snowflakes and calcite also crystallize in this system.



CUBA, *ku'ba*, the "Pearl of the Antilles," a long, narrow island, the largest and most important of the West Indies group. With the Isle of Pines, which lies to the south, and several smaller and unimportant islets, it forms the republic of Cuba.

The center of Cuba from east to west is considerably east of the southern coast of Florida. From Florida Keys across the straits of Florida the distance to the island is 110 miles. Havana is in almost the same longitude as Detroit, Michigan, and is 200 miles west of the longitude of Panama. The area of the island is 44,164 square miles; the republic is therefore nearly as large as Pennsylvania. Its total length is 730 miles, and its greatest width is fifty miles. The coast line measures 2,500 miles.

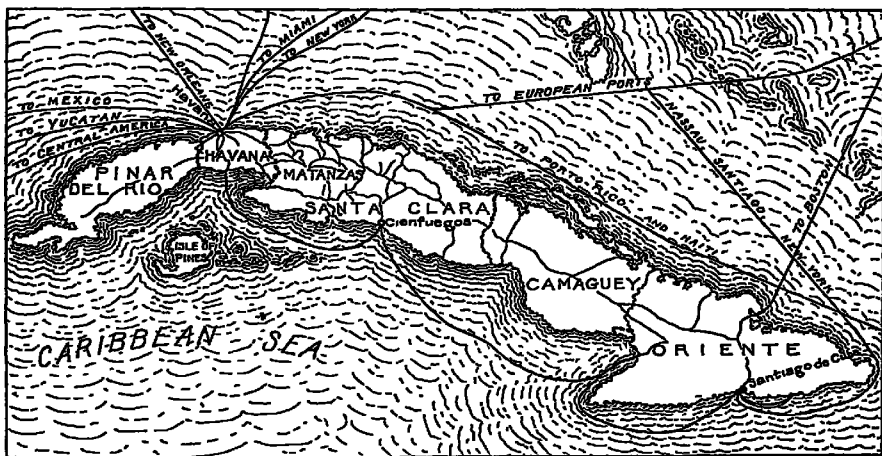
The People. The population of the island in 1933 was 4,011,088. Nearly two-thirds of the inhabitants are native Cubans, about 190,000 were born in Spain, and the remainder are largely Americans, negroes, and Chinamen. The negroes are most thickly settled in Oriente, where 43 per cent of the people are black; they are least numerous in Camaguey, where they are but 18 per cent of the population. Because Spain owned the island from its discovery until 1898 the official language is Spanish, but English is gaining remarkable headway. When independence was secured 59 per cent of the Cubans over ten years of age were illiterate. Twenty years later the native illiteracy had been reduced to 41 per cent, during

the time when new educational facilities were not yet fully established. The religion is very largely Roman Catholic. The University of Havana is at the head of the system of education. One good secondary school is maintained by the government in each of the six provinces; there are nearly 4,000 free public schools and 400 private schools.

Surface and Drainage. The Copper Mountains traverse the island from east to west and form a low watershed, varying from 110 to 400 feet in altitude. The highest peak is Pico Turquinos, which has an altitude of 8,320 feet. From each side of the watershed the surface slopes gradually to the coast, forming undulating, well-watered plains,

August are the hottest months. The average annual rainfall at Havana is sixty inches, and, with few exceptions, the entire island has an abundance of rain for all agricultural purposes; in some sections it reaches 100 inches. Only a few small areas in the interior require irrigation. In the highlands the climate is generally healthful, but in the lowlands much sickness prevails, although recent experience seems to indicate that this is due more to the unsanitary condition of the country than to the climate.

Mineral Resources. Deposits of coal, copper, gold, silver, and iron are found particularly in the district surrounding Santiago de Cuba. Copper has been mined in



THE ISLAND OF CUBA

covered with luxuriant forests and plantations. Numerous lagoons and salt marshes occur in the lowlands along the coast. The irregularity of the coast line provides a number of good harbors, but in many places the coast is low and rocky and the water is shallow.

The island has about 200 streams large enough to be called rivers, but they are all short, and only a few are navigable. The Rio Cauto, which is the largest, admits of the passage of boats for sixty miles. There are only a few small lakes, but the large salt water lagoons on the north side resemble lakes.

Climate. Cuba has a tropical climate. The mean annual temperature is 78°, and the maximum seldom exceeds 88°. July and

the mountains with profit; iron ore is shipped from Santiago to the United States, the annual shipment amounting to about 30,000 tons. Asphalt is obtained in the Bay of Cardenas, and considerable salt is procured in other localities. The other mineral deposits are not of sufficient extent to warrant working.

Agriculture. The island is covered with a luxuriant growth of vegetation. Flowers, grasses and many varieties of herbaceous plants are found on the lowlands, while the mountains to their summits are clothed with heavy forests, containing mahogany, ebony, rosewood, granadilla, cedar, live-oak and other valuable timber.

The soil and climate are favorable to agriculture, which is the leading industry. Pre-

vious to the last war for independence, the country contained over 90,000 plantations, farms, cattle ranches and orchards. During the war many of these were devastated, but after the establishment of a free government agriculture became permanently more stable. Sugar, tobacco, coffee and tropical fruits are the leading products. Of these sugar is the most important; it was once predicted that when all of the land suitable

Moron to Jucaro, and another connects Camaguey with the port of Neuvetas. In all, there are about 2,360 miles of railway, some of which is in poor condition.

The irregularity of the coast provides numerous good harbors, about forty being accessible to ocean-going vessels. Havana, Matanzas, Cabanas, Cienfuegos and Santiago de Cuba are the important seaports. Regular communication is maintained with the Atlantic and Gulf ports of the United States and with the commercial centers of Europe. In 1918 a new line was established between Cuban and Spanish ports. Cuba is situated at the convergence of many transatlantic routes, and the ships of all nations find their way into the harbor of Havana, the principal seaport. The commerce of the island is rapidly growing. The foreign trade is largely with the United States, and sugar is the leading commodity.

Government. Cuba is governed in accordance with the Constitution adopted in 1921, but largely revised late in 1928. The government is republican in form and differs but slightly from that of the United States. The head of the administration is the President, who must be a native Cuban or a naturalized citizen who served ten years in the Cuban army during the wars for independence. He is elected by popular vote for a term of six years and cannot serve more than one consecutive term. He appoints and removes members of his Cabinet, who are responsible to him for the administration of their departments. The legislative power is vested in a Congress, consisting of two houses, a Senate and a House of Representatives. The former contains six Senators from each of the six provinces. Since 1933 all retiring Presidents become Senators for life. The House of Representatives consists of one member for every twenty-five thousand inhabitants or fraction thereof more than 12,500. They are elected for six years, one-half retiring every three years. Congress holds annual sessions. Cuba has a currency system, and its money is made under contract by the United States Mint, but American money is highly favored, and it circulates freely.

The island is divided into six provinces: Havana, Matanzas, Pinar del Rio, Camaguey, Santa Clara and Oriente. Each province has a governor and an assembly, both elected by the people for a period of three



A SCENE IN RURAL CUBA

for growing sugar cane should be brought under cultivation, an annual crop of a half million tons of sugar could be produced. In reality, the sugar needs of the world have stirred Cuban planters to extraordinary endeavors. The average annual production for several years following 1926 was almost 3,000,000 tons; the high point was more than 4,000,000 tons. The depression years reduced the output to 2,400,000 tons, by decree.

Tobacco is second only to sugar in importance, and a large revenue is derived from its growth and manufacture. Cuban tobacco maintains a standard value in all markets, on account of its excellent flavor, and the province of Pinar del Rio is the most important tobacco producing region in the world. Cattle raising is an important industry, and large areas are given to the growing of vegetables, corn and poultry. Bee keeping is also successful.

The manufactures are practically confined to cigars and other products of tobacco and to the manufacture of raw sugar.

Transportation and Commerce. Roads are generally poor, and lack of good means of transportation in the interior is a great hindrance to commerce. Havana is connected with Pinar del Rio, Matanzas, Cabanas, La Isabella, Camaguey, Santiago de Cuba, Manzanillo and Cienfuegos by railway. A line of railway extends across the island from



Underwood & Underwood

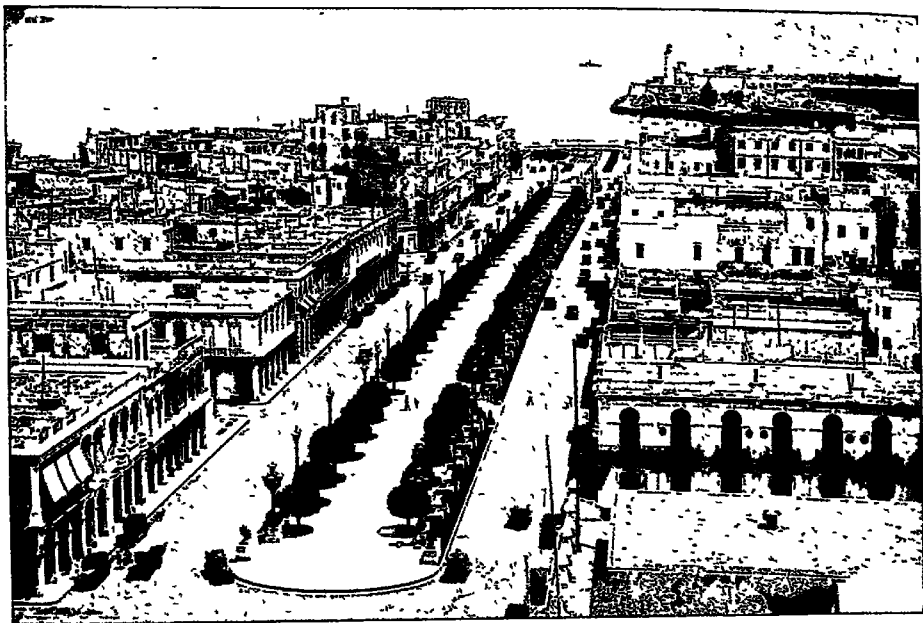


Ewing Galloway

SCENES IN CUBA

Above: The Capitol of Cuba, in Havana, dedicated Feb 24, 1931.

Below: A section of Cuba's Central Highway, one of the world's finest automobile roads



THE PRADO, PICTURESQUE STREET IN HAVANA
View is toward the entrance to the harbor and the historic Morro Castle.

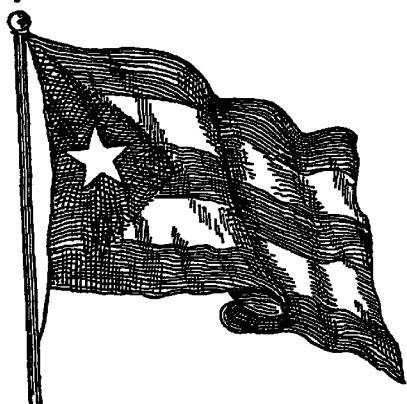


Ewing Galloway

A BUSY SCENE AT A SUGAR CENTRAL (MILL) IN CUBA
The cane is brought from the plantations in large two-wheeled carts, drawn by oxen.

years There is a supreme court for the interpretation of the Constitution, and a Court of Appeals is established in each of the six provinces. Every male Cuban over twenty-one years of age and not mentally incapacitated or convicted of crime, all Spanish residents who have been on the island since April 11, 1899, and all foreigners who have resided there since January, 1, 1899, are entitled to franchise. Foreigners who have taken up their residence there since January, 1, 1899, are required to show five years' residence for naturalization.

History. Cuba was discovered by Columbus in 1492. It was settled in 1511 by Diego Columbus, son of Christopher, who founded Santiago in 1514, and in 1519 the present city of Havana was established. This settle-



CUBAN FLAG

The triangular field is red, the stripes are alternately blue and white

ment soon became the foremost town in the island and the center of government. In spite of the typically cruel government exercised from the first, the colony remained until 1898 the "Ever-Faithful Isle."

The Spaniards reduced the natives to slavery and treated them so cruelly that by the middle of the sixteenth century the race was almost extinct. This required the introduction of negroes from Africa, and they were employed so constantly and under such terrible conditions that mortality among them was greater than increase, and the government was compelled to import constantly increasing numbers. Havana was destroyed by the French in 1594 and again in 1554 and was captured by the Dutch in 1624, but it was immediately restored and thereafter was

repeatedly the prey of filibusters and pirates.

During the eighteenth century, Cuba was exploited by a line of vicious and oppressive governor-generals but after the Seven Years' War, during which England had captured the island only to return it to Spain in 1763, prosperity ruled and the resources of Cuba were developed. Still, unscrupulous governor-generals were enabled to repress its natural progress by exacting enormous taxes and vast sums in tribute. The island was attractive to American statesmen, especially those of the South, as a field for the extension of slavery, and it was the secret ambition of many Presidents to gain control of it by purchase. Finally, in 1848, President Polk offered \$100,000,000 to Spain, but it was refused. In 1854, eminent American ministers to Great Britain, France and Spain, among whom was James Buchanan, united in drawing up the Ostend Manifesto (which see), which urged the United States to annex Cuba by force if Spain refused to sell. Nothing came of these efforts.

Meantime, the people of Cuba were striving to abolish slavery and to gain their independence. Many insurrections occurred, notably those of 1849 and 1854, which, though causing great suffering, accomplished little. Finally, in 1868, began a ten years' struggle which extorted from the Spanish government the promise of liberal government, representation in the Spanish parliament and the encouragement of industry. These promises were but partly kept, however, and discontent increased until 1895, when the last great rebellion broke out. Spain sent General Campos to the island to suppress the rebellion, but the insurgents under Gomez, Maceo and Garcia continued to gain successes and by guerrilla warfare completely checked the efforts of the Spanish soldiery to pacify the island. Campos was succeeded by Weyler, who undertook such savage measures that sympathy was aroused for the Cubans throughout the world and especially in the United States. Weyler was superseded by Blanco in 1897, and in spite of the promise of autonomy the insurrection continued and seemed to gain strength in the following winter.

Cuba meantime had frequently requested the United States to interfere in its behalf, and the time seemed opportune for such interference when an American warship, the *Maine*, was destroyed in Havana harbor, Feb-

ruary 15, 1898, by some mysterious cause which the American people believed to be known to Spain. 'In April of that year Congress declared that "the people of Cuba are and of right ought to be free and independent." War was declared against Spain, and in a brief conflict American arms were triumphant everywhere. By the Treaty of Paris, December 10, 1898, Spain relinquished all sovereignty over Cuba.

The United States temporarily occupied the island. A constitutional convention was called in 1901, and a Constitution was adopted, including a special amendment, known as the Platt Amendment, proposed by the Congress of the United States, to guarantee that the government should never enter into any treaty with a foreign power which would impair the independence of the island; that it should not assume any debt for whose payment it could not provide; that the United States could interfere to preserve the independence of the island or to protect life, property or individual liberty; that the United States be given certain coaling and naval stations. In December, 1901 the first President was elected, in the person of Tomas Estrada Palma, and on May 20, 1902, the United States formally withdrew.

In 1906 an insurrection broke out, headed by a defeated candidate for president. The Cuban army was powerless and social order in some provinces was almost destroyed. The United States therefore intervened and sent a commission, headed by Hon. W. H. Taft, Secretary of War, to the island. This commission tried to reconcile the opposing factions, but without success. President Palma resigned and the Cuban Congress failed to elect a successor. Thereupon Secretary Taft issued a proclamation placing the republic under military government, and under the control of the United States order was immediately restored. The United States government in again assuming control of the island made it very plain that the control would continue only until the people of Cuba were again in condition to proceed peaceably with a new election, and the government could be transferred to the officers thus chosen. A national election was held November 14, 1908, and Gen. José Miguel Gomez was chosen President. On January 13, 1909, President Gomez was inaugurated. On January 13 the United States troops began to withdraw, and in April the last detachment

departed, leaving the Cuban republic again under control of its own government.

Trouble occurred again over the elections of November, 1916, when M. G. Menocal, the Conservative candidate, was chosen President. The opposition party, under the leadership of ex-President Gomez, revolted, and in February, 1917, seized Santiago de Cuba the capital city of Oriente. With the aid of an American company of Marines order was restored and Menocal was installed as President. The 1920 elections resulted in the election of Alfredo Zayas. His administration was stormy, and when, in 1924, he was again opposed by Menocal, he supported Gen. Gerardo Machado, who was elected. In 1928, Machado was re-elected for a six-year term. Machado was a man of strong character but his administration was marked by many excesses, and by great industrial and agricultural depression. Harsh measures were adopted to suppress the growing opposition to his rule, but in 1933 the Cuban army, until then loyal, joined the revolting element, and Machado fled from Havana, finding asylum first in the United States, then in Santo Domingo. Mendieta became President in 1934; Miguel Gomez, in 1936.

Related Articles. Consult the following titles for additional information.

Camaguey	Isle of Pines
Cienfuegos	Matanzas
Garcia y Iniguez	Palma Tomas, E
Gomez y Baez, M	Santiago de Cuba
Havana	Spanish-American War

CUBE, a geometric solid having six equal square faces. A cube is used as a unit of measure for volume. One *cubic inch* is a volume equivalent to a cube one inch in each of its dimensions. The volume of a cube is equal to its height a , times its width a , times its length a , or a^3 . From this circumstance the third power of a number, which is the product of a number taken three times as a factor, is called its cube. One of the famous mathematical problems of antiquity was that of the "duplication of the cube," that is, to find a cube whose volume is twice that of a given cube. It is impossible of solution by the processes of elementary mathematics. See CUBIC MEASURE.

OU'BEES, the fruit of species of plants belonging to the pepper family. The cubebs of pharmacy are produced by a climbing woody shrub, a native of the East Indies. It has round, ash-colored, smooth branches, each of which bears from forty to fifty small,

globose fruits, about one-fifth of an inch in diameter. The odor of cubebs is agreeable and aromatic; the taste, pungent, acrid and slightly bitterish. It is used by the natives for flavoring, but in other countries chiefly in medicine, as an astringent and in cases of indigestion and catarrh.

CUBE ROOT, the process of resolving a number into three equal factors, or of finding the length of one edge of a cube

The radical sign ($\sqrt[3]{}$) with the small figure 3 over it denotes that the cube root of the number over which it stands is to be extracted. Thus, $\sqrt[3]{1728}=12$

The cube of a number is the product of the number used three times as a factor.

The cube root is one of the three equal factors.

The cube of a number having two places of figures consists of the cube of the tens, plus three times the product of the square of the tens by the units, plus the product of three times the tens by the square of the

$$\begin{aligned}
 48 &= 40 + 8 \\
 (40 + 8)^3 &= 40^3 + 3(40^2 \times 8) + 3(40 \times 8^2) + 8^3 \\
 40^3 &= 64,000 \\
 3(40^2 \times 8) &= 38,400 \\
 3(40 \times 8^2) &= 7,680 \\
 8^3 &= 512 \\
 48^3 &= 110,592
 \end{aligned}$$

In extracting the cube root of a number we take the number apart, as it were, so as to show the three equal factors. The process is therefore the reverse of finding the cube of the number. Students of arithmetic usually find the geometric or block method the most satisfactory in explaining the process. In the diagrams, Figure 1 represents 40^3 and has a content of 64,000 cubic units; Figure 2 represents $3(40^2 \times 8)$ and the contents of these three blocks are 38,400 cubic units; Figure 3 represents $3(40 \times 8^2)$ and the contents of these blocks are 7,680 cubic units; Figure 4 represents 8^3 or 512 cubic units.

In extracting the cube root of 110,592, we

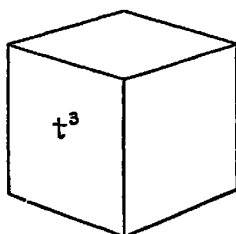


Fig 1

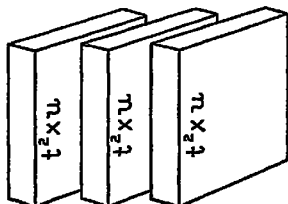


Fig 2

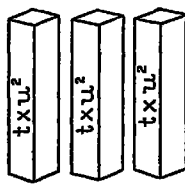


Fig 3



Fig 4

units, plus the cube of the units. The formula may be expressed algebraically by the cube of the quantity $t + u$, in which t represents the tens and u the units. $(t + u)^3 = t^3 + 3(t^2 \times u) + 3(t \times u^2) + u^3$.

The following multiplication, expressed by an algebraic formula, shows how this result is obtained:

$$\begin{array}{r}
 t+u \\
 t+u \\
 \hline
 t^2+tu+u^2 \\
 t^2+2tu+u^2 \\
 \hline
 t^3+3t^2u+3tu^2+u^3 \\
 t^3+3t^2u+3tu^2+u^3 \\
 \hline
 t^3+3t^2u+3tu^2+u^3
 \end{array}$$

A similar result in figures may be obtained by taking any number of two places, as 48, and cubing it, as you would a literal quantity in algebra. This may at first glance appear difficult to young pupils, but a careful study of the following will clear it up:

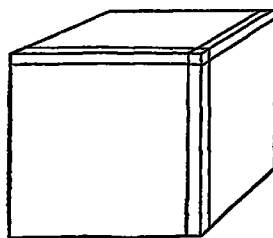


Fig 5

use 40 as the first divisor, since by inspection we see that it is the largest number whose cube is contained in 110,000, the first period

PROCESS

$$\begin{array}{r}
 110'592 \quad | \quad 40+8 \\
 64'000 \\
 \hline
 46'592 \\
 3 \times 40^2 = 4800 \\
 3 \times 40 \times 8 = 960 \\
 8^3 = 64 \\
 \hline
 5824 \\
 46'592
 \end{array}$$

After subtracting 64,000, the cube of 40, we have a remainder of 46,592, which represents

the quantity in the unused portion of the formula— $3(40^3 \times 8) + 3(4 \times 8^3) + 8^3$.

Since we know the tens figure in the root to be 4, we use three times the square of the tens as a trial divisor to find the units. When this figure is found we add to the trial divisor the remainder of the formula, $3(40 \times 8) + 8^3$, and multiply the sum of these additions and the trial divisor by 8, the result being 46,592.

Figure 1 represents a cube the length of whose respective edges is 40 units; figure 5 represents the cube after the additions shown in figures 1, 2 and 3 have been made, and its respective edges have a length of 48 units.

CUBIC MEASURE teaches the process by which to ascertain the volume of bodies which are solids, having the three dimensions of length, breadth and thickness. The volume of a solid whose sides are regular is found by multiplying together the numbers representing its three sides. The arithmetical table relating to solids is given below:

- 1 cubic foot=1728 cubic inches
- 1 cubic yard=27 cubic feet
- 1 gallon=231 cubic inches
- 1 bushel=2150 4 cubic inches

Each of the figures above, as 1728 cubic inches, was found by multiplying a related number by itself three times. A cubic foot is a regular solid 12 inches in length, 12 inches in breadth and 12 inches in thickness; its volume equals $12 \times 12 \times 12$ inches, or 1728 cubic inches. To find the side of a cube which will contain one gallon, or one bushel, extract the cube root of the number which represents its volume (see **CUBE ROOT**).

Under the heading Mensuration will be found many exercises in measurements. See, also, Arithmetic.

CUBIST SCHOOL OF PAINTING, a school of art in which the idea conveyed by the artist is expressed through cubes, triangles and other geometrical figures. The principle upon which the Cubist works may be expressed thus:

"He takes the elements of expression from the forms and colors of nature and uses them not to represent objects but to produce an organism which will contain in terms of art what a given subject means to him in terms of sensation."

The result is a picture which suggests but does not reproduce and which may be called an exaggerated impressionistic creation. The Cubists, who came into prominence in 1913, went to all manner of extremes in working out this peculiar theory, producing some

manifest absurdities, but also some pictures of real value. It was generally agreed that they were too radical to establish a permanent school of art, but that they rendered art a valuable service in arousing a new interest in the subject of painting. The founder and leader of the movement is Paul Picasso, who painted the much-discussed, *The Woman with the Mustard Pot*. Other pictures that were subject to considerable comment included Marcel Duchamp's *Nude Descending a Staircase* and Francis Picabia's *The Dance at the Spring*.

CUBIT, a measure of length frequently mentioned in the Bible, and in common use among the ancients. The cubit of the Hebrews was equal to 17.58 inches, English measure, and that of the Romans, about 17.4 inches. The word is from the Latin for *elbow*, as originally the cubit was supposed to be the distance from the elbow to the end of the middle finger.

CUCK'OO, a bird common in warm countries and a summer resident in more northern lands. Altogether there are nearly 200 species known. In North America the tree crow or yellow-billed cuckoo is com-



CUCKOO

mon, but it is a shy bird, keeping in the woods and fitting about quietly, uttering hoarse chucking notes which people used to say foretold rain. It is a long, slender bird of

a pretty greenish-brown color, and builds its flimsy nest and rears its own young. The European cuckoo, however, lays its small egg upon the ground and then picks it up and deposits it in the nest of a smaller bird, where it is cared for by the unwilling mother (see COWBIRD). The song of this bird, which gave it its name, is much sweeter than that of the American species. The cuckoo of Africa and Asia is closely allied to the European cuckoo.

CUCUMBER, *lu'kum ber*, the familiar fruit of a vine which is closely related to the muskmelon, and which was introduced to the world from the East Indies. In Southern Europe it is cooked before being used as an article of food, but in North America it is used principally as salad or pickle. The varieties are numerous, and each has its particular value. In a wild state in tropical Asia, the cucumber is very bitter and almost poisonous, even now it occasionally happens that a fruit is found that is bitter throughout, and almost always near the stem there is a bitter section.

CUFIO, or **KU'FIO**, a term derived from the town of Cufa, in the territory of Bagdad, applied to the written characters of the Arabian alphabet, in use from about the sixth century of the Christian Era until about the eleventh. The earliest copies of the *Koran* were written in these characters.

CULLOM, **SHELBY MOORE** (1829-1914), an American statesman, born in Wayne County, Ky. He was admitted to the bar in Illinois and began his practice in Springfield, where he was soon elected to the legislature; from there he was sent to Congress. From 1876 to 1883 he was governor of Illinois, in the latter year beginning a career of thirty years in the United States Senate as a Republican. He was one of the framers of the interstate commerce law of 1889, and was one of the commissioners to establish American government in Hawaii. In 1913 he was appointed commissioner in charge of the great Lincoln Memorial at Washington. D. C. Cullom was a friend of Lincoln, and in his later years looked much like the great President.

CUMBERLAND, Md, the county seat of Allegany County, 152 miles northwest of Washington, on the Potomac River and the Chesapeake & Ohio Canal and on the Baltimore & Ohio, the Pennsylvania, the Cumberland & Pennsylvania, and the Western Mary-

land railroads. There is an airport. It is the trade center of a large coal district, and its population and importance is the second city of the state. The industries include manufacturing of railroad material, glass works, tanneries, flour mills, steel and iron works and railroad repair shops. The place was laid out in 1785 on the site of Fort Cumberland, which was erected at the outbreak of the French and Indian War. Cumberland was incorporated as a city in 1850. It adopted the commission form of government in 1909. Population, 1920, 29,337, in 1930, 37,747, a gain of 28.5 per cent.

CUMBERLAND MOUNTAINS, a part of the Appalachian system. The several ridges of these mountains extend from West Virginia along the boundary of Virginia and Kentucky, across Tennessee into Alabama, and form a plateau about fifty miles wide. They rarely exceed 2,000 feet in height. They are covered with good timber, but the soil is not very rich. The famous Cumberland Gap, once a gateway to regions farther west, lies at the place where Tennessee, Virginia and Kentucky meet. See **APPALACHIAN MOUNTAINS**.

CUMBERLAND RIVER, a river which rises in Kentucky in the Cumberland Mountains, flows nearly westward into Tennessee, where it makes almost a semicircle, returns into Kentucky and finally empties into the Ohio at Smithland. It is about 680 miles long, and is navigable for steamboats to Nashville, nearly 200 miles from its mouth.

CUMBERLAND ROAD, a road constructed by the United States government, extending from Fort Cumberland, Md, to Vandalia, Ill, a distance of 800 miles. It was begun about 1806 and was finished about 1840. It was for years under Federal control and was commonly called the Great National Pike, but by 1856 each state through which it passed was controlling the section within its borders. It played an important part in opening the West to settlement and was for years the chief avenue of westward migration. Henry Clay was one of the most zealous advocates of the enterprise.

CUMMINS, **ALBERT BAIRD** (1850-1926), an American lawyer and statesman, identified with the progressive wing of the Republican party. Cummins was born at Carmichaels, Pa. He practiced law in Chicago from 1875 to 1878, when he removed to Des Moines, Iowa. There he became prominent

in Republican politics, and from 1902 to 1908 was governor of the state, serving three terms. He achieved fame as an earnest advocate of tariff revision by the Republican party, a policy known for a time as the "Iowa idea." In 1908, on the death of Senator Allison, Cummins became United States Senator; at the election in 1909 he was re-elected for the full term, and was again elected for the term ending in 1921. He was prominently mentioned as a candidate for the Vice-Presidency on the Republican ticket in 1908, and in 1912 was an active candidate for the nomination for President.

CUNEIFORM, *ku ne's form*, **INSCRIPTIONS**, the name applied to the wedge-shaped characters of the inscriptions on old Babylonian and Persian monuments, sometimes also described as arrow-headed or nail-headed characters. These characters appear to have been originally of the nature of hieroglyphs and to have been invented by the primitive Accadian inhabitants of Chaldea. From the Chaldeans they were borrowed, with considerable modification, by the conquering Babylonians and Assyrians, who were Semites by race and spoke an entirely different language. The use of the cuneiform characters, however, ceased shortly after the reign of Alexander the Great; and after the lapse of nearly 2,000 years it was doubted by many if the signs had ever had an intelligible meaning. They were even regarded by some as the work of a species of worm, by others as mere talismanic signs or astrological symbols. Gradually, however, through the efforts of Grotefend, Lassen, Rawlinson and other investigators, the means of translation were perfected.

Many of the inscriptions first discovered are in three different languages and in as many varieties of cuneiform writing. The most prominent, and at the same time the simplest and latest of these, is the Persian, with about sixty letters. Next older in time and much more complex is what is designated as the Assyrian or Babylonian system of writing, consisting of from 600 to 700 characters, partly alphabetic, partly syllabic. Lastly comes the Accadian inscriptions, the oldest of all, originally proceeding from a people who had reached a high state of civilization 3,000 years before Christ and whose language ceased to be a living tongue about 1700 B. C. The most celebrated trilingual inscription is that at Behistun, cut upon the

face of a rock 1,700 feet high, recording a portion of the history of Darius. The British Museum contains many thousands of inscribed clay tablets, cylinders, prisms and the like, the decipherment of which is still in progress. See **ASSYRIA**.

CUPID, according to classic mythology, the god of love. He was the son of Mars, the god of war, and Venus, the goddess of love. His attributes were the bow, quiver and wings, and he was represented in painting and sculpture as a chubby child with ganzy wings and roguish, dumpy face. Cupid loved a fair mortal princess, Psyche, who after many trials was granted immortality by the gods. As Cupid is the emblem of the heart, his love, Psyche, is the symbol of the soul. See **PSYCHE**.

CUPOLA, in architecture, a spherical, domelike vault, on the top of an edifice, so called because of its resemblance to a cup. The Italian word *cupola* covers a circular building, like the Pantheon at Rome and the Round Temple of Vesta at Tivoli. The term is also applied distinctively to the concave interior, as opposed to the dome, which is the entire curved structure. The term *cupola* is commonly, though incorrectly, applied to any small dome-lantern or observatory projecting above a roof. See **DOOM**.

CURCULIO, *kur kul'io*, a family of beetles with rough coats and long snouts, sometimes called *snout beetles*. Among the numerous species are some of the insects which prey on orchard fruits; the plum, peach, apricot, cherry and apple crops also are often seriously menaced by their ravages. During the winter the beetles hide in the bark, and when the spring arrives they emerge from their hiding places to feast on the flowers and foliage. The eggs are laid in the fruit, the female using her snout to press them into the pulp, and when the grubs are hatched they eat the fruit on the inside. Beetles can be killed with arsenate of lead solution, two pounds of which should be mixed with fifty gallons of water. Infested fruit should be shaken from the tree and destroyed, to protect the unspoiled crop.

CURFEW, *kur'fu*, the ringing of a bell at a certain hour of the evening, usually at nine o'clock, to indicate that all outdoor occupations must cease and that people must remain within doors. The custom was common during the Middle Ages and was introduced into England by William the Con-

queror. The law was repealed by Henry I in 1103, but the bell continued to be rung in many districts to modern times, and is still rung in a few small towns.

Curfew Must Not Ring To-night is a popular poem based on the custom. It tells the story of a girl in the Cromwell era in England who saved her lover from death by clinging to the bell clanger and thus preventing its sounding the hour set for his execution. The author is Rose Hartwick Thorpe.

CURIE, *ku re'*, **PIERRE** (1859-1906), and **MARIE SKŁODOWSKA** (1867-1934), French scientists, the discoverers of the wonderful properties of radium. Professor Curie was born in Paris, was educated at the Sorbonne, and later became professor of physics there. In 1893, after several years of investigation, Curie and his wife announced the existence of radium. In 1903 they were awarded the Davy Medal of the Royal Society and one-half of the Nobel prize in physics. After the death of her husband in 1905, Madame Curie a Polish woman educated in Paris, succeeded him as professor of physics at the Sorbonne and in 1911 her further researches won for her the Nobel prize in chemistry. In 1921 she visited the United States, was enthusiastically received in scientific circles and presented with \$100,000 worth of radium.

Her eldest daughter, Irene (born 1897), was her associate in research after the death of M. Curie. Irene married Frederic Joliot, a fellow scientist, and they have since worked together. The two won the Nobel Prize in chemistry for 1935, for their discoveries in connection with the neutron. Madame Curie's younger daughter, Eve (born 1904), became a talented musician.

CURLER, a genus of birds belonging to the same family as the snipe and woodcock. The birds have long, slender, partly naked limbs, short, rounded tails and very long, slender bills. In North America are found the *Hudsonian* and *Esquimo* curlews, which nest in the Arctic regions in summer and visit Southern South America in winter; and the *long-billed* curlew, found in various parts

of the United States. Its beak is sometimes eight inches long. All curlews build crude nests on the ground.

CURLING, a favorite Scottish winter game, played also in parts of Canada and the United States. Large, smooth stones having somewhat the shape of a flattened hemisphere, with an iron or wooden handle at the top, and from thirty to forty-five pounds in weight, are slid along a prepared course on the ice. The object of the player is to lay his stone as near to the mark as possible, to guard that of his partner which has been well laid before or to strike off that of his antagonist. Each player throws two stones, and then the count is made and the play resumed from the other end of the course. A series of match games is called a *Bonspiel*. International matches are played between Canadians and Americans.



CURLING STONE

CURRANT, the name of two well-known shrubs cultivated in gardens for their fruit. The red currant, which is used principally for jellies, is a native of Southern Europe, Asia and Americas. The white currant is a cultivated variety of the red. The black currant, native to most parts of Europe and found abundantly in Russia, has a strong taste and odor, but it is used for jelly and in making tarts and puddings, to which it adds excellent flavor. The dried currants of commerce are really raisins, a small variety of grape which originally came from Corinth and therefore received the name of currant.

CURRENCOY. See **MONEY**

CURRENTS, **OCEAN**. See **OCEAN CURRENTS**

CURRIE, **ARTHUR W.**, **SIR** (1875-1933), a Canadian military officer who gained renown in the World War as commander of the Canadian forces. He was born in the County of Middlesex, Ont., of Scotch-Irish parentage, attended the village school of Napperton, and completed his education at the Strathroy Collegiate Institute. After teaching school in Sydney, B. C., he engaged for several years in the insurance business, ultimately becoming head of a real estate firm. In 1895 Currie enlisted as a private in the Fifth Regiment of the Canadian Gar-



MADAME CURIE

rison Artillery in British Columbia, rose steadily to the rank of Lieutenant-Colonel, and in 1913 was transferred to the Fiftieth Gordon Highlanders of Canada, Victoria.

Currie was one of the first Canadians to volunteer for active service at the outbreak of the World War. As soon as mobilization orders were received he entered with his Highland Regiment for the concentration camp, Valcartier, in Quebec, was soon made brigadier-general, and eventually reached Flanders. In September General Currie succeeded to the position of General Commanding Officer of the First Canadian Division; it was this division that won the famous Battle of Vimy Ridge.

In June, 1917, General Currie succeeded Sir Julian Byng in Command of the Canadian army in France, and so continued to the end of the war. He received many honors from Great Britain and France.

From 1920 until his death Sir Arthur was principal and vice-chancellor of McGill University in Montreal.

CURTIS, GEORGE WILLIAM (1824-1892), an American writer, orator and publicist, born in Providence, R. I. He was a member of the Brook Farm Community for eighteen months (see *BROOK FARM*), and after leaving there he traveled for a time in Europe and the Orient. For years he was editor of *Putnam's Monthly*, and he began in 1853 the "Editor's Easy Chair" papers in *Harper's Monthly*. On the establishment of *Harper's Weekly* he became one of its editors. After the Civil War he devoted himself to reform movements, especially civil service reform, in the agitation of which he was long the most conspicuous figure. All his works are marked by grace of diction, dignity and high moral sentiment. A novel, *Trumps*, and many of his other books appeared first in periodicals. Perhaps the best known of his writings is *Prue and I*.

CURTISS, GLENN HAMMOND (1878-1930), an American aviator, famed for his invention of the flying boat, and for many brilliant flights and demonstrations. He was born at Hammondsport, N. Y., and from his boyhood was interested in mechanical vehicles. In 1906 he came into wide notice by establishing a new speed record when he rode a specially constructed motorcycle (his own invention) at Ormond Beach, Fla., making a mile in 26.4 seconds. In 1908 he won the *Scientific American* cup with an aeroplane

at Hammondsport, and the next year he carried off the International cup at Rheims, France. In 1910 he made a flight from New York to Albany (150 miles) in two hours, twenty-one minutes, winning the New York World prize of \$10,000. Later Curtiss received the Aero Club of America trophy for his invention of the hydroaeroplane and the flying boat. The Smithsonian Institution awarded him a medal in 1913. Curtiss ranks second only to the Wright brothers in his contributions to the science of air navigation. See *FLYING MACHINE*.

CURVE, a line which changes its direction at every point. A line which curves continuously at a uniform rate, having all its points equally distant from a point within, is called a circle (which see). The curved line has an important place in higher mathematics.

CURWOOD, JAMES OLIVER (1878-1927), an American author, was born at Owosso, Mich. He attended the University of Michigan, and for seven years was engaged in newspaper work, for a time as editor of the *News-Tribune*, Detroit. From 1907 he devoted himself to writing novels, depicting life in the Canadian northlands, on which he was a foremost authority. He was an active worker for wild life and forest conservation. Among his best known books are: *Flower of the North* (1912), *Nomads of the North* (1919); *The Valley of Silent Men* (1920); *The Alaskan* (1923); *A Gentleman of Courage* (1924); *The Ancient Highway* (1925); *Black Hunter* (1926); and *The Plains of Abraham* (1927).

CURZON, GEORGE NATHANIEL, Lord (1859-1925), an English diplomat and statesman, born at Kedleston and educated at Balliol College, Oxford. He first became private secretary to the Marquis of Salisbury. Afterwards he sat in Parliament for twelve years.

In 1898 Lord Curzon was appointed Viceroy and Governor-General of India, a position which he held until 1905. His administration was characterized by energy and ability and was notable for the aid which he gave to education in the Empire, the strengthening of the military forces and his open opposition to the encroachments of Russia upon English territory in the East. On his return to England he took a seat in the House of Lords. In 1895 Lord Curzon married Miss Daisy Leiter of Chicago. In 1916, ten years after her death,

he married Mrs Grace Duggan of Buenos Aires. In January, 1919, Lord Curzon was made a member of the new Cabinet organized by Lloyd George, becoming President of the Council and leader in the House of Lords.

CUSHMAN, CHARLOTTE SAUNDERS (1816-1876), an American actress, famed for her interpretation of tragic rôles. In 1915 she was awarded a place in the Hall of Fame (which see), and was the first stage personage to receive this honor. Miss Cushman made her first appearance in opera and scored a distinct success, but the loss of her voice made her decide to study for the drama. Her first rôle was Lady Macbeth, which remained throughout her career her greatest part. Among her other rôles were Juliet, and Meg Merrilies in Scott's *Guy Rannering*. Although most famous in tragedy, she was very successful, also, in such rôles as Lady Teazle. She retired from the stage in 1874.

CUSTER, GEORGE ARMSTRONG (1839-1876), an American soldier, the hero of a battle with the Sioux Indians. He was graduated at West Point, and at the outbreak of the Civil War was given a commission in a cavalry regiment. General McClellan was so impressed by his energy and bravery that he appointed him aid-de-camp. Captain Custer took the first colors captured by the Union army. In 1863 he was appointed brigadier-general of volunteers, and he gained the rank of major the same year. For gallantry at the Battle of Winchester he was made brevet colonel and major-general of volunteers. After the war, he served on the Great Plains, and in June, 1876, his whole command was defeated and slain on the Little Big Horn, by the confederate Sioux under Sitting Bull. The spot has become a national cemetery.

CUSTOMS DUTIES, the taxes levied upon goods passing from one country to another. The system of customs duties dates probably as far back in history as ancient Greece, though the name is of comparatively recent origin. This arose in the long conflict between the Crown and Parliament in England over the right of taxation. To meet the claims made by the House of Commons to the exclusive right to vote all supplies, it used to be maintained that there were certain duties on exportation and importation to which the crown had acquired a right by *custom*; and the name thus acquired was retained after the power claimed by the

lower branch of Parliament had been settled by permanent legislation. The first custom-house was erected in London in 1304.

Customs duties are levied on incoming goods, so that the term is practically synonymous with *import duties*. They are of two kinds, *specific*, that is, reckoned on the quantity (weight or number), and *ad valorem*, reckoned on the value of merchandise. The former are far more easily assessed and collected. A bitter controversy has always been waged over the expediency of customs duties between the advocates of absolutely *free trade*, those who wish to have no impediment to the free transfer of goods, and the *protectionists*, who wish to set up duties, by which to exclude foreign goods from competition with those of home production. (See **TARIFF**; **FREE TRADE**)

Upon the organization of the United States government after the close of the Revolution the system of customs duties then in operation in England was adopted with scarcely any modification, under the direction of Alexander Hamilton, the first Secretary of the Treasury, the first custom-house being established in New York in 1799. Among the especial features of the new customs system was that of debentures, or drawbacks, which were certificates entitling an exporter of imported goods to a rebate of duties paid on their importation, if he wished to re-export them. Subsequently the object thereby accomplished was more directly facilitated by permitting the importer to "bond" his goods in government warehouses until he was able to pay the duties; and later on the practice was modified still more in favor of the importer by permitting him to take out of "bond" from time to time portions of the invoice of goods consigned to him, paying the proportionate amount of duties. If goods are to be re-exported they can be withdrawn from bond without the payment of duties. This system of *bonded warehouses*, which is now a feature of the customs service in every civilized country of the world, was embodied in an act of Congress passed in 1846, known as the Walker act.

In normal times it is intended that the moneys received from customs and from the collection of internal revenue (which see) shall defray a very considerable part of the expenses of the national government.

CUTLER, MANASSEH (1742-1826), a colonial clergyman, physician, scientist, and

statesman, who made a marked contribution to the settlement of the Northwest Territory. He was born in Connecticut. After graduation from Yale College he accepted a Massachusetts pastorate, the while studying medicine that he might be able better to serve his village, which had no physician. In science he published the first systematic classification of New England plant life. In 1786 he helped to organize the Ohio Company (which see), and it was he who succeeded in purchasing from Congress 1,500,000 acres of land in the new western territory for eight cents per acre, after others had failed. While dealing with Congress, he helped to draft the Ordinance of 1787 (which see), and the next year he was leader in founding the town of Marietta.

CUTTLEFISH, the common name for certain mollusks, generally applied to the particular species from which sepia is prepared (see *SEPIA*). A small shell or bone, sometimes called the *pen*, is inside the animal, and this is the cuttlefish bone placed in bird-cages. When a cuttlefish is pursued and in danger of being captured, it throws out from a bag a black substance which darkens the water and enables the animal to escape. It is from this substance that sepia is obtained. All cuttlefish are marine animals, and in the tropics some very large specimens have been found.

CUT WORM, a caterpillar which preys on wheat, corn and other grains and on garden vegetables. The cutworms feed at night, and by day remain in hiding underneath the soil. Usually they cut off the plant attacked close to the ground, but some cutworms climb trees and sever buds and tender leaves. These pests may be destroyed with poison sprays. Where bits of withered vegetation show the presence of cutworms, the earth should be dug over and the worms killed. Cutworms are the larvae (young) of a genus of night moths.

CUVIER, *koo'vyo'*, GEORGE LEOPOLD CHRETIEN FREDERIC DAGOBBERT, Baron (1769-1832), a distinguished French naturalist, born at Montbéliard. His lectures on natural history, distinguished not less for the elegance of their style than for profound knowledge and elevated speculation, were attended by all the accomplished society of Paris. In 1800 he was made professor of natural history in the College of France. Under Napoleon, who fully recognized his

merits, Cuvier held important offices in the department of public instruction. In 1819 he was received among the forty members of the French Academy. Among his best-known works are *An Elementary Table of Animals*, *Lessons in Anatomy* and *The Animal Kingdom*.

CYANOGEN, *si'an'o jen*, a compound of carbon and nitrogen. It is a colorless gas of a strong odor resembling that of peach pits, and burns with a rich purple flame. Cyanogen is highly poisonous. It unites with oxygen, hydrogen and most nonmetallic elements, as well as with the metals, forming cyanides. Combined with hydrogen it forms prussic acid, which is the most powerful poison known.

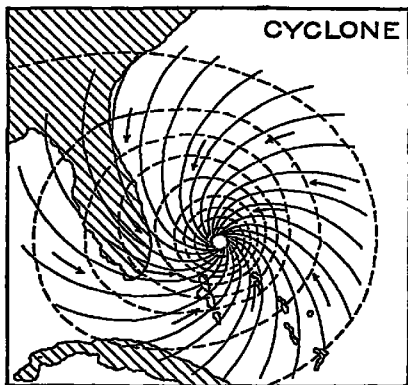
CYCADS, *si'kads*, a family of plants resembling palms or ferns in their general appearance, but more nearly related to the pines. The leaves are large and featherlike, and usually rolled like a crozier when in bud. All are natives of warm regions, and many are handsome plants. Fossil remains show that cycads are trees of great antiquity and that they once formed a much larger part of vegetation than they do at the present day.

CYCLADES, *sik'la deez*, a group of islands in the Grecian archipelago lying southeast of Greece, in the possession of Greece, forming a separate province. The largest islands belonging to this group are Andros, Paros, Tenos, Delos, Naxos and Rhenea. The islands are mountainous and have productive soil. Grapes and olives are raised, and fishing is one of the most important occupations of the people. Hermopolis, the principal trade center, is situated on the island of Syra. Much valuable building stone, including marble, is obtained from the Cyclades. Population, about 130,000.

CYCLAMEN, *sik'lah men*, a genus of primroselike, bulbous plants, natives of Europe and Asia, but now commonly grown in the United States and Canada. They are all herbs with handsome, white, rose-colored or purplish flowers, and are favorite greenhouse plants. The leaves, which are large, heart-shaped and variegated in color, add much to the beauty of the plant. The flowers are scentless. In the United States the Persian variety, best known, is valued as a house plant.

CYCLONE, *si'klone*, a circular, or rotary, storm or system of winds, varying from fifty to 500 miles in diameter and revolving

around a center, which advances at a rate that may be as high as forty miles an hour. The term is popularly applied to the destructive wind storms common in the Mississippi Valley, but these are technically known as tornado (which see). Cyclones of greatest violence occur within the tropics. Two storms in different hemispheres revolve in opposite directions. In the southern hemisphere the direction of a storm is like that of the hands of a clock, and in the northern hemisphere it is opposite to that of the hands of a clock. The cyclones of the West Indies



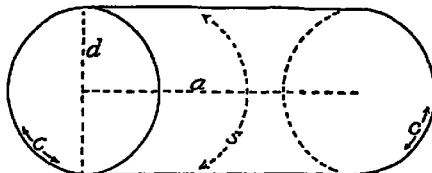
are described in the article HURRICANE. An *anticyclone* is a storm of opposite character, the general tendency of the winds being away from the center. The anticyclone usually follows the cyclone and produces fair weather. Cyclones are preceded by a singular calm and a great fall of the barometer. Nearly all storms are cyclonic in their nature, but in the temperate regions the movements are so mild that the rotary motion of the storm is lost sight of except by trained observers of the weather bureau. See STORMS.

CYCLOPS, *siklops*, in Greek myths, a fabled race of one-eyed giants, the sons of Uranus and Ge (Heaven and Earth), slain by Apollo. They were usually represented as a numerous race living in Sicily and rearing cattle and sheep, but later traditions describe them as the servants of Vulcan working under Aetna and engaged in forging armor and thunderbolts.

CYLINDER, *sil'in dur*, a circular solid whose two bases are equal parallel circles, and whose diameter is the same throughout its length. The distance between the circular

bases is the altitude of the cylinder; its curving surface is the lateral or convex surface.

Volume of a Cylinder. The volume of a cylinder is equal to the area of one of the bases multiplied by the distance between



EXPLANATION OF THE CYLINDER

a, altitude, *c*, circumference of base, or perimeter, *d*, diameter, *s*, lateral surface

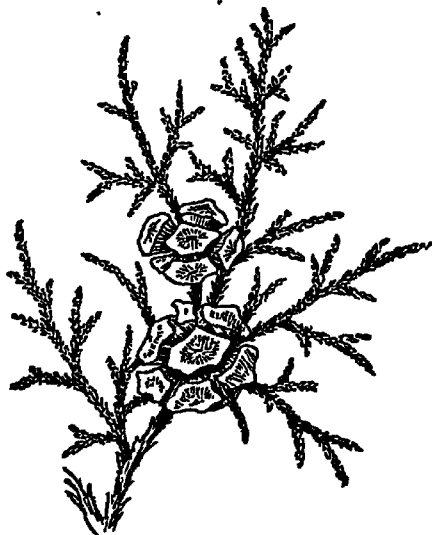
them, or the altitude. To find the area of a base, use the formula employed in finding the area of a circle: $\text{Area} = 3.1416 \times \text{radius}^2$ (see CIRCLE). Therefore, volume of cylinder = $3.1416 \times \text{radius}^2 \times \text{altitude}$. See MEN-SURATION, subhead *The Cylinder*.

CYMRU, *him'ri*, a branch of the Celts. The Cymri appear to have succeeded the Gaels in the great migration westward, and to have driven the Gaelic branch into Ireland, the Isle of Man and the Highlands of Scotland, while they themselves occupied the southern parts of Britain. At a later period they were themselves driven out of the Lowlands of Britain by the invasions of the Angles, Saxons and Jutes, and were compelled to take refuge in the mountainous regions of Wales, Cornwall and the north-west of England. Wales may now be regarded as the chief seat of the Cymri.

GYNIC SCHOOL OF PHILOSOPHY, or **CYNICUS**, a group of Greek philosophers of the fourth century B. C., who developed a system of doctrines based upon the principle that virtue is the only good. As defined by Antisthenes, virtue is practically a wise direction of life, and of itself it constitutes happiness. Since continued happiness is not possible if wants and desires which may not be satisfied are regarded, virtue consists in living, as much as possible, in independence of disturbing wishes. The simplest, most natural life is desirable. Art, literature, science, wealth, honor and pleasure are to be discarded, because they give rise to wants that cannot be satisfied. The most ardent follower of this school was Diogenes (which see), by whom its doctrine was carried to extremes in the ordinary affairs of life.

In modern speech a *cynic* is one who disbelieves in or doubts the wisdom of social usages, or of personal character or motives, and expresses his doubts by sarcasm or sneers.

CYPRESS, *si'pres*, a genus of cone-bearing trees, distinguished by their small, dark, evergreen, opposite leaves and their tiny, solitary flowers. The best-known species is the *common cypress* of Europe, which is a dark-colored evergreen, with extremely small leaves, which entirely cover its branches. It has an almost quadrangular shape, except at the top, where it becomes pyramidal. Cypress trees are rather dark and somber in



CYPRESS LEAVES AND CONES

appearance and have long been used for decorative purposes in cemeteries; and branches of cypress were formerly worn at funerals as emblems of mourning. The wood is hard, compact and durable and has a reddish color and pleasant odor.

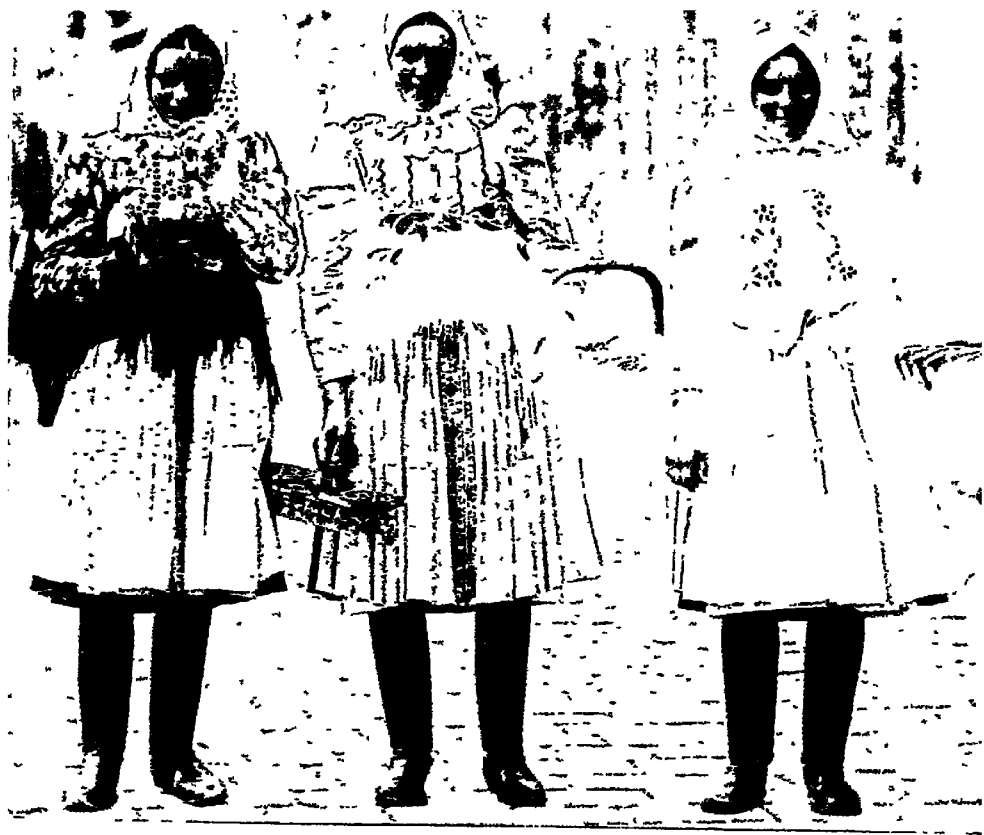
The *bald cypress*, common to the swamps of the Southern states, is a deciduous tree and one of the most valuable of timber trees. Although the wood is soft, its remarkable durability under water makes it of great value, and the size of the tree furnishes timbers of large size. In the regions where the tree grows to best advantage, it forms great forests, covering many square miles of territory. A peculiar feature of the tree is the development upon its roots of peculiar knots,

or growths, called *knees*, which sometimes reach a height of ten feet and when fully grown have their tops above the water. It is not well understood of what use these knees are to the trees. In the United States the annual lumber cut of cypress amounts to nearly 1,000,000,000 board feet and is valued at more than \$20,000,000.

CYPRUS, *si'prus*, an island lying forty miles south of Asia Minor in the Mediterranean Sea, belonging to Great Britain. It is the third in size among the Mediterranean islands, ranking next to Sicily and Sardinia, and has an area of 3,584 square miles. In 1931 the population, not including military forces, was 348,000. The principal towns are Nicosia, the capital, 23,667; Lamasol, 15,350; and Larnaca, 11,872. Agriculture is the chief occupation of the people, and the most important products are wheat, barley, vetches, oats, olives, cotton and grapes. The government has encouraged farming by constructing irrigation works, and there is a Forest Department which is helping to preserve and develop the timber.

Copper mining, anciently of great importance, has been resumed, and the island is one of the world's few sources of asbestos. It is of interest to know that the derivation of our word *copper* may be traced to *Cyprus* (see **COPPER**). The island has over 700 miles of good motor road, cable connection with Alexandria and Haifa, a railway, and telegraph service. Cyprus has been a possession of many different countries; from 1878 to 1914 it was administered for Turkey by England. On the outbreak of the World War it was annexed to the British Empire.

CYRUS, *si'rus* (about 600-529 B. C.), king of Persia, a celebrated conqueror, called *Cyrus the Great*. According to Herodotus, he was the son of Cambyses, a famous Persian, and of Mandane, daughter of the Median king Astyages. Herodotus states that Astyages, troubled by a prophecy that his grandson was to dethrone him, gave orders that Cyrus should be destroyed immediately after his birth, but the boy was saved by the kindness of a herdsman and at length was sent to his parents in Persia. He soon gathered a formidable army, conquered his grandfather and became master of Media and founder of the Medo-Persian Empire. According to the records, he proved a wise and moderate king. After his conquest of Media and Persia he invaded Lydia, conquered the



LIFE IN CZECHOSLOVAKIA

These women from the farms don their characteristic colorful raiment and go to town on a shopping tour. One does not have to guess that American women prefer their dainty footwear to the boots that are a necessary part of the Czech costume. At right, a street in the clean city of Bratislava, called Pressburg before the World War, when it was under Austro-Hungarian rule

Ewing Galloway



country and then turned against Babylon, which fell almost without a contest before the victorious arms of the hosts of Cyrus. The conqueror entered the city in triumph and made himself king. Here he showed his generosity toward conquered peoples by contributing to the release of the Jews from captivity. Cyrus was killed in an expedition against the Scythians, who dwelt north of his domains.

CYRUS, (?-401 B. C.), called *The Younger*, to distinguish him from Cyrus, the founder of the Medo-Persian monarchy, was the second son of Darius II. He formed a conspiracy against his elder brother, Artaxerxes Mnemon, and was condemned to death, but was released at the request of his mother and made governor of Asia Minor. Here he secretly gathered an army, of which 10,000 were Greek auxiliaries, and marched eastward. His brother with a large army met him in the plains of Cunaxa (401 B. C.), and in the battle which followed, Cyrus was slain. The account of the expedition and the retreat of the Greek soldiers is given by Xenophon in the *Anabasis*.

CZAR, or **TSAR**, *sahr*, a title borne by the emperors of Russia before the revolution of 1917. The word is a corruption of the Roman title *Caesar*, first adopted in 1547 by Ivan the Terrible. The empress of Russia bore the title *csarina*, while the heir apparent and his wife were known as the *csarevitch* and *csarevna*.

CZECH, *chek*, a division of the Slavic race occupying parts of Bohemia, Moravia, Austrian Silesia and Northern Hungary, or Slovakia. Bohemia is their great stronghold, and Prague is the chief center of Czech culture. The Slovaks of Moravia and Slovakia are their nearest kindred; in fact, the Czechs and Slovaks are practically one race, and speak nearly the same dialect. These peoples were under Austrian rule for centuries, but they were restive and intensely conscious of a national spirit that found definite expression when the World War created a crisis in the dual monarchy of Austria-Hungary. The result was the formation of the republic of Czechoslovakia. Czech literature has had a continuous existence from the ninth century, and is represented by works of poetry, fiction, science and history. At Prague (now Praha) there is a Czech university and a national theater. See the article following, describing the Czech country.

Related Articles Consult the following titles for additional information

Bohemia	Prague
Czechoslovakia	World War

CZECHOSLOVAKIA, a new Central European republic, formed in 1918 from the ruins of the Dual Monarchy, Austria-Hungary. It took from Austria its crownlands of Bohemia, Moravia, and Silesia, and from Hungary a large part of Slovakia. The boundaries were fixed on the theory of "self-determination of peoples" as to their racial divisions. The area of the country is 54,226 square miles, the population in 1930 was about 14,760,000. Prague, now known as Praha, in Bohemia, is the capital city. The chief element of the population is Czech and Slovak. The Czechs and Slovaks are practically one race and speak about the same language (see **CZECH**).

For many years before the World War the national movement of the Czech-Slovaks had been causing the Austrian government great anxiety. In Bohemia, especially, the agitation for independence could not be checked, and the bitter opposition of the people to the cause of the central empires added considerably to the troubles of the dual monarchy throughout the war. Thousands of Czechs and Slovaks deserted to the Russians, and when Russia withdrew from the war, the Czech-Slovak regiment started for France by way of Siberia. While on the march they came into conflict with Russian revolutionists, and were kept in Siberia by the allies to guard the Trans-Siberian Railroad. Others of their kindred formed legions and fought for the allies in France and Italy.

A national Czech-Slovak Council was organized in Paris under the presidency of professor Thomas Masaryk, of the University of Prague, and in June, 1918, the independent Czech-Slovak state was officially recognized by France. Great Britain gave similar recognition in August, and the United States followed in September. On October 19 a declaration of independence was issued in Paris, as by that time the Czechs had become masters in Praha and had placed Czech money in circulation. The close of the World War made the impending break-up of Austria-Hungary an accomplished fact, and the republic of Czechoslovakia was duly erected, with Professor Masaryk as its first President.

During 1920 and 1921 Czechoslovakia, Rumania, and Jugo-Slavia entered into a political and economic agreement, this union for mutual aid and protection being called the Little Entente. They sought the aid of France in maintaining their sovereignty and sealed the pact by a treaty.

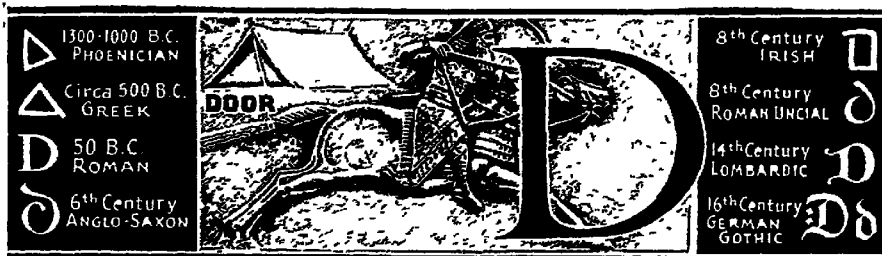
It was conceded that President Masaryk could retain the post he honored for as long as he lived, and such a life tenure was offered him. However, in 1935, at the age of 85, he resigned the cares of state, and in his place Eduard Benes (born 1884) was chosen as President. The latter had been Prime Minister from the time of the organization of the republic, and was considered one of the strongest statesmen of Europe.

The home of the Czechs and Slovaks is one of the richest agricultural sections of Europe; all the temperate zone products are raised, especially the hardy grains, potatoes, and sugar beets. One-third of the area is yet heavily wooded. The country possesses abundant supplies of coal and iron. About 12,000 factories attest a flourishing industrial life; of these, more than 100 are sugar factories. The majority of the people are Roman Catholics; other religions find full freedom of worship.

Related Articles. Consult the following titles for additional information

Austria-Hungary	Little Entente
Benes, Eduard	Masaryk, Thomas
Bohemia	Moravia
Hungary	World War

CZERNOWITZ, *cher'no vits*, a city in Rumania, now known as Cernautz, before the World War was the capital of the Austrian province of Bucovina. It has a mixed population, chiefly Rumanians, Germans, Jews, Poles, and Greeks. The city is one of the country's chief railroad centers, with lines running to all of its northern and western neighbors. Among the prominent buildings are the archiepiscopal palace, the Greek-Oriental cathedral and a handsome Jewish synagogue. The educational institutions include a university, with a library exceeding 100,000 volumes, a gymnasium and industrial and trade schools. There are manufactories of machinery, oil, lumber and beer. During the World War the city was thrice captured by the Russians, but was each time reconquered. At the close of the war, in 1918, when Austria-Hungary ceased to exist, Bukovina (now Bucovina) was claimed both by Rumania and the Ukraine. The decision was finally made in favor of Rumania, and it is now an integral part of that state. Population, 111,112, in 1931.



D, the fourth letter in the alphabet. In form the English **D** is the same as the Latin **D**, which was developed from the Greek Δ . Thus, in turn, was derived from the Phoenician character, which was probably an outgrowth of an original hieroglyphic representation of a door. The Δ does, in fact, still retain a resemblance to a tent door. In corresponding words of related languages, *d* is often interchanged with *t*, which it resembles in its mode of pronunciation.

In music **D** is the second note in the natural, or **C**, scale. As an abbreviation **D** represents five hundred, and when a line is placed above it, **D** represents five thousand.

DAB'CHICK, a name which in the United States is commonly given to the pied-billed grebe. See **GREBE**.

DACE, *dase*, a river fish which attains a length of about ten inches, found in central North America from the eastern shores to the Missouri River. It is bluish above and creamy below, and there is a slight yellowish band on the side. The fish described is commonly called the horned dace, because it bears a black spot on its dorsal fin. Other names for the dace are *dare* and *dart*.

DAKSHUND, *daKsh'hoont*, a strangely formed dog with short legs and a long, round body, formerly used in the central part of Europe in hunting foxes and badgers. Though the dachshund is grotesque in appearance, it is prized as a household dog in many parts of the world, particularly in Germany, because of its intelligence and courage. The animal has broad, rounded ears, a long, cone-shaped head, long, tapering tail and paws turning outward. The short, silky coat may be reddish-brown, black and tan, gray and tan or spotted.

DADDY-LONG-LEGS, the popular name of a spiderlike insect, known also as the American *harvestman*. It has a body usually

oval or globose, and long, exceedingly slender legs, which are rather elevated in the middle, so that when the animal walks its body almost touches the ground. It has a peculiar, disagreeable smell, and feeds upon insects. Often the daddy-long-legs is seen in great numbers in barns or other sheltered places. In England the term is applied to the crane fly.

DAEDALUS, *ded'a lus*, a mythical Greek architect and artisan. He built for the king of Crete the labyrinth in which the Minotaur was confined, but having seriously offended the king, he was himself imprisoned. To effect his escape and that of his son, he made two pairs of wings, which he fastened on their shoulders. The son, Icarus, in flying across the sea, rose so high that the heat of the sun melted the wax with which the wings were fastened together, and he fell into the sea and was drowned. Daedalus was unharmed. See **MINOTAUR**.

DAFFODIL, the popular name of certain species of *narcissus*, which are among the earliest flowers of spring. The trumpet daffodil, a popular variety, has its flower at the end of the stalk, growing at a right angle to it.

DAGO, *dah'go*, **ISLAND**, an island in the Baltic Sea, politically a part of Estonia, situated near the entrance to the Gulf of Finland. Its surface consists of chalk beds and swampy lowland, and the inhabitants, who number about 16,000, engage chiefly in fishing and agriculture. The island is 370 square miles in area. It was captured by the Germans in 1918, after having been a Russian possession since 1721. At the close of the war the island was given to Estonia. See **ESTONIA**.

DAGUERREOTYPE, *da ger'o type*, the original photographic process, so called from its inventor, Daguerre, (see below). It con-

sisted in sensitizing a silver plate with the vapor of iodine and then placing it in a camera obscura, previously focused, and afterward developing the picture by vapor of mercury. It was then fixed by immersion in hyposulphite of sodium. After thorough washing and drying the picture was covered



DAHLIAS

with glass to prevent its being rubbed off. The process is now replaced by photography (which see).

Louis Jacques Mandé Daguerre, *da gar'* (1789-1851), was originally a scene-painter at Paris, but as early as 1814 his attention was directed to the subject of photographing pictures on metal. In 1833 he succeeded in perfecting the new photographic process, which caused a great sensation in the world of science. Daguerre was made an officer of the Legion of Honor, and an annuity of 6,000 francs (\$1,200) was settled on him.

DAHLGREN, *dal'gren*, John Adolph (1809-1870), an American naval officer and artilleryman. He entered the navy in 1826. In 1850 he brought forward an invention of a type of cannon, which was named for him and which was of great value during the

Civil War, but later became obsolete. At the beginning of the war he became commandant of the Washington navy yard, and in 1863 was made rear admiral and was placed in command of the South Atlantic blockading squadron. In 1866 he commanded the South Pacific squadron, and in 1868 took charge of the bureau of ordnance in Washington. In the following year he was again appointed commandant of the Washington navy yard.

DAHLIA, (or *dale'ya*), a genus of plants belonging to the composite family, so called after the Swedish botanist Dahl. Dahlias are native of Mexico, but they are extensively cultivated in the United States, Canada and Europe, in an immense number of varieties, producing large and beautiful flowers of almost every imaginable color.

DAHOMEY, *da ho'mi*, now a part of French West Africa, was formerly an independent negro kingdom. Its northern boundary is not well defined, but it extends in a narrow belt southward between Togo and Nigeria to the Gulf of Guinea, an Atlantic arm, where is found its chief city and seat of government, Porto Novo, which has 20,000 inhabitants.

The area of Dahomey is 41,302 square miles, and its population was 1,133,300 in 1933; only 900 are white. The natives are of pure negro stock, and wherever the soil is fertile they are good agriculturists, raising corn, yams and potatoes. The forests contain coconut palms and oil palms, and a decreasing supply of rubber.

France gained a foothold here in 1851 and gradually extended its influence in the form of a protectorate (which see) until 1894, when the whole kingdom became a part of French West Africa.

DAIRYING, or DAIRY HUSBANDRY, that branch of agriculture which is given to the production of milk and its various products. Dairying has always been given some attention on farms, and in Denmark and Holland it has been the leading agricultural occupation for many generations. Dairying as a distinct occupation in North America has developed since 1860, the year in which the first cheese factory was built.

Dairying is carried on for three purposes—selling milk, making butter and making cheese. Milk is sold to supply the consumers in cities and for the purpose of making condensed milk. The by-products of milk are

skim milk, buttermilk and whey. These are usually mixed with meal and fed to swine. Whey and skim milk are also used extensively in the manufacture of milk sugar.

It was formerly supposed that dairying could be carried on with profit only within a limited section of the country and during the summer months; but the use of scientific methods has shown that, with proper care, good butter and cheese can be made in nearly all parts of North America, and that dairying can be made profitable during the entire year.

The rapid growth of cities and the enormous development of transportation facilities have exerted a great influence on the progress of this industry. As the growth of the cities has increased the dependence of millions of inhabitants on the farmer for food, the demand for dairy produce has greatly increased, while the improved means of transportation have made possible the delivery of the produce to the cities at a profit to the farmers. The general changes in the character of industry have thus led many to adopt dairy farming as a specialty instead of following it incidentally. The United States is the leading dairy country in the world. It contains over 23,000,000 milch cows, has a total milk production of nearly 85,000,000,000 pounds a year, and has a correspondingly large production of butter, condensed milk and cheese.

The Dairy. Some of the leading scientific principles of animal husbandry are readily illustrated by showing their application to a dairy farm. To conduct a dairy successfully the dairyman must give careful attention to the following particulars:

- 1 Careful selection of his herd
- 2 The construction and maintenance of suitable stables and other buildings necessary to the work
- 3 Providing the right sort of pasturage
- 4 Providing the right sort of feed in addition to pasturage
- 5 Facilities for the care and marketing of the dairy products.

Neglect of any one of these points is liable to lead to failure in the enterprise.

The Herd. The cows should be selected with reference to the main purpose for which the dairy is conducted. If the dairy is to supply milk for city markets, the cows should be chosen with due regard to the quantity of milk which they produce. If the dairy is devoted to supplying the market

with butter, more regard must be paid to the quantity of butter fat in the milk than in the former case.

Experienced dairymen are good judges of cows and seldom make mistakes in the selection of herds. For the benefit of those of less experience the following points, taken from Brook's *Animal Husbandry*, are given:

Head—Small, lean and bony, with large muzzle and mouth. The nose and face should be free from fleshiness.

Eye—Full, large, lively in expression, but at the same time mild, clear and bright. The whole expression of the face and eye should be motherly.

Forehead—May be either straight or dish-shaped, but the latter gives a more well-bred appearance.

Ears—Thin, large, active, and for most breeds should be of an orange color within.

Neck—Should be rather thin, especially near the head, and long. It should be free in most breeds from loose, pendent skin.

Horns—Should be of moderate size.

Shoulders—The animal at the shoulders may be from two to four inches lower than at the hips. The shoulders themselves should be thin, especially at the top, lean and bony.

Chest—Should be deep, that is, it should have a large measurement from top to bottom. It is less broad and roomy than in beef breeds. The section through the animal behind the shoulders should have an elliptical outline. Too great thinness behind the shoulders is, however, a mark of weak constitution.

Back—Should be rather long and rugged. The vertebrae of the backbone should be rather wide apart so that the fingers may be pressed down between the points in the ridge of the back. This is only one feature of the general looseness of structure which is looked for in the dairy type, as contrasted with the close, compact structure which is desirable in the beef type.

Loins—Should be fairly broad, the hip bones rather high and well apart. The bones, moreover, are often rather farther forward than in the beef type. This gives a long and strong hind quarter.

Thighs—The thighs should be thin, especially on the inside, in order to give room for a large udder.

Flank—The flank is well up, and rather thin.

Legs—The legs should be rather short and the hind legs may be rather crooked. The bones of the legs should be moderately fine. The forelegs are comparatively near together, the hind legs wide apart.

Tail—The tail should be long and fine, with a long switch. A long tail is believed to indicate that the vertebrae of the backbone are somewhat loosely connected, which, as has been pointed out, is considered highly desirable.

The General Outline—When looked at from the side, the general outline should be that of a wedge, the upper line, or line of the backbone, and the lower line, or the line of the belly, approaching each other from behind. When looked at from behind or from above, the animal should also present a wedge shape, the lines of the wedge approaching each other from rear to front. The dairy cow, therefore, shows a double wedge. The ribs, to harmonize with this general wedge shape, are rather flat immediately behind the shoulders. At this point they do not spring out very widely, but toward the posterior part of the animal the ribs spring out from the backbone more and more broadly in order to give room for large internal organs "for a big workshop."

The Udder—The udder should not be very pendent, but should obtain capacity by breadth, being wide from side to side, extending well forward, well backward also, and high up between the thighs. It should be broadly and firmly attached to the abdomen. The skin of the udder should be thin and delicate. The udder should be well filled out at the bottom between the teats, and the latter should be wide apart, squarely placed, and of good size.

A daily record of each cow should be kept and those that do not reach the required standard should be sold or fattened for beef and their places taken by others. Only the calves from the best milkers should be retained for future additions to the herd. In this way the strain of the herd will be strengthened from year to year. The record should enlighten the dairyman concerning two points: the average daily quantity of milk given by each cow and the length of time from calving before the quantity of milk begins to diminish. The most profitable animals are good milkers for a long time. They may not produce such large quantities of milk while fresh as some others, but their record for six months or a year shows them to be far more profitable. It costs no more to keep a good cow than a poor one, and the first is kept at a profit, while the second is kept at a loss.

The next thing necessary is a milk test which will show the amount of butter fat as well as the quantity of cream. This test should be made by an expert in a creamery or butter factory if possible, because in these places the necessary apparatus is at hand and an expert is usually in charge. If, however, the farmer is so situated that he must make his own test for milk, by sending to his experiment station for directions, he will receive such assistance and

Outline on Dairy Products

I. MILK

- (1) Description
- (2) Composition
 - (a) Water
 - (b) Casein
 - (c) Sugar
 - (d) Fat
 - (e) Salt
- (3) Uses
 - (a) Food
 - (b) Basis for butter, etc.

II. BUTTER

- (1) Manufacture
- (2) Packing and shipping
- (3) Uses

III. CHEESE

IV. BY-PRODUCTS

- (1) Oleomargarine
 - (a) How made
 - (b) Legal restrictions
 - (c) Tax
- (3) Condensed milk

Questions on Dairying

What work is performed by the separator?

What is a creamery? Generally located where?

What causes milk to sour? Give uses of sour milk. What is whey?

Name the different kinds of cheese. What foreign country is noted for its cheese?

How is milk regarded as a diet? Why should it be drunk slowly?

What makes cream rise to the top?

How is it possible for milk to be the means of spreading disease?

Name some of the dishes prepared in cooking whose foundation is milk or cream.

Is milk an absorbent? What dangers lie in this fact? What are some of the rules for the taking care of milk?

In what ways can milk be adulterated?

guidance as will enable him to make the test successfully.

The Stable. Milk can be produced only from healthy cows, and in most regions where dairying is carried on, proper housing of the herd is the important factor in preserving the health of the animals. Dis-

ease, especially tuberculosis, is frequently contracted because the stable is poorly ventilated and because it is kept in a filthy condition. The stable should be well ventilated and well-lighted. The walls should be kept free from dust and should be frequently whitewashed. Above all, the floors should be kept free from filth and plenty of fresh, clean litter should be spread daily. Open feed troughs and partitions made of piping or iron railing, which will not collect the dust, are the most desirable.

The yard and grounds about the barn should also be free from weeds, manure and rubbish.

Feed. Fresh grass is the most desirable feed for milch cows, but suitable pasturage for a large herd requires so much land that some other source of food supply available all the year is necessary. During the months when pastures are not in grass, the cows must be fed entirely from this other source. The right sort of ration must be determined and the most economic means of supplying it be provided. Many farmers use ensilage, or silage, as it is commonly called.

Related Articles. Consult the following titles for additional information:

Agriculture	Creamery
Butter	Cream Separator
Cattle	Milk
Cheese	Milk, Condensed
Churn	Silo and Silage

DAISY, an attractive, much-loved flower which grows in meadows and fields in Europe and America. The typical daisy is pure white and single with a yellow or brown center, but double daisies have been produced in great variety of colors. The daisy blooms almost continuously and has already become partially naturalized in the New England states. In the United States and Canada the oxeye daisy is a species of wild chrysanthemum, known commonly as the marguerite. In America the name *daisy* is loosely applied to other flowers, such as the black-eyed Susan and some species of wild asters. During the age of chivalry the daisy was the emblem of fidelity and love, but it now signifies simplicity.



DAISY

Shasta Daisies. Accompanying the article on Luther Burbank there is an exact-size picture of the Shasta daisy, and by its side daisies of the size of its original parents. Burbank's achievement with this flower is as fascinating as a fairy story. From all over the world where daisies grew he secured seeds of the best varieties—not simply a few, but thousands. These were planted under best conditions and watched with closest care. They were all destroyed except the best specimens, but from their death there came a new daisy larger and more beautiful and of a harder variety, one that would flower in every climate. More than 10,000 seeds were required for this one experiment.

DALLAS, GEORGE MIFFLIN (1792-1864), an American Vice-President, born in Philadelphia. He was graduated at Princeton in 1810 and went to Russia as private secretary to Albert Gallatin, special envoy. In 1828 he was elected mayor of Philadelphia. This office he resigned to become United States district attorney. In 1831 he was sent to the United States Senate and later was minister to Russia. He was elected Vice-President with Polk in 1844 and was later sent by Pierce as minister to England.

DALLAS, *dal'as*, Tex., the second city of the state, though but little smaller than Houston, its nearest rival. It is the county seat of Dallas County and is situated 31 miles east of Fort Worth, on the Trinity River. It is one of the great railroad centers of the state, being served by the Burlington, the Chicago, Rock Island & Pacific, the Gulf, Colorado & Santa Fé, the Missouri-Kansas-Texas, the Saint Louis-San Francisco, the Saint Louis Southwestern, the Southern Pacific, the Texas & Pacific, and the Texas Electric railways. There are several interurban lines, 19 bus lines and two airports. Dallas is on the routes travelled by American Airways and United Air Lines.

The population in 1930 was 260,475, a gain of 63.8 per cent in 10 years.

Dallas has more than 700 factories. It is the world's largest manufacturer of cotton gin machinery; it also excels in saddlery, harness and leather goods. Other important industries and products are cement, petroleum products, automobile accessories, printing and publishing, bagging and tents, textiles, clothing and cottonseed products.

There are 152 schools in the city accommodating a school population of 60,000. Higher

and professional educational facilities include Southern Methodist University, Jefferson Law School, and Baylor University schools of medicine, dentistry and nursing. Special schools include academies for girls and for boys, and a military academy. Dallas has a Carnegie Library, more than 300 churches, 16 golf courses, 72 periodical publications, three radio-broadcasting stations, and 130 hotels valued at \$30,000,000. The 60 parks cover 4,400 acres. The state fair grounds cover 160 acres. There are 80 auditoriums in the city. Dallas has a large number of imposing public buildings, including a municipal building with over 30 acres of floor space, a large courthouse and two of the largest hotels in the South. Greater Dallas is made up of Dallas, Highland Park and University Park, adjacent but separate municipalities.

DALLES, *dals*, the name given in America to various rocky gorges and the cataracts and rapids flowing in them. The word is the French for *trough* or *drain*, and was first used in its present sense by early French explorers. The dalles of the Columbia are about 200 miles from its mouth, where the river is compressed by lofty basaltic rocks into a roaring torrent. The rocks here present a scene of rare beauty. To overcome the obstacle to navigation at this point in the Columbia, a canal has been constructed around the dalles at a cost of \$5,500,000. The dalles of the Saint Louis are a series of cataracts near Duluth, Minn., and the dalles of the Wisconsin are at Kilbourn, Wis.

DALLES, *THE*, or **DALLES CITY**, *ORE.*, the county seat of Wasco County, 88 miles east of Portland. It is situated on the south bend of the Columbia River. It is served by the Southern Pacific Railroad. This section of the river valley is noted for the grandeur of its scenery.

The principal industries are sheep and cattle raising, and grain and fruits are cultivated. The city contains flour and grist mills, salmon canneries and wool-scouring plants and has a large trade in live stock and wool. Population, 1930, 5,883.

DALMATIA, *dal ma' she ah*, a district in the kingdom of Jugo-slavia. It stretches along the coast of the Adriatic Sea from Istria to the city of Cattaro, and is bounded on the north by Croatia, on the east by Bosnia (including Herzegovina) and Montenegro. The Dinaric Alps form a natural

boundary between Dalmatia and Bosnia. Dalmatia has an area of about 5,000 square miles, including the numerous coast islands; it has an estimated population of 622,000.

The surface of Dalmatia is diversified by hills and mountains. Because of political unrest agriculture has long been in a backward state, but the fertile valleys produce fruits in abundance, including grapes, figs, olives and a cherry used in making the famous *maraschino* cordial. On the coast, fish, especially the tunny and the sardine, abound. The trade of the country is mostly confined to the coast towns, chief among which are Zara, the capital, Sebenico, Cattaro, Spalato and Ragusa. Cattaro is one of the best natural harbors in Europe.

Dalmatia was anciently the southern portion of the Roman Province of Illyricum. In the Middle Ages part of the region belonged to the Venetian Republic. After varying changes of ownership the whole country became in 1814 a part of the Austrian Empire.

After the dissolution of Austria-Hungary, at the close of the World War (1918), the right to possess Dalmatia was claimed both by Italy and by the new Jugo-Slavic state. The former based its claim on historical and cultural grounds, and on a secret treaty signed in 1915 by England, Russia, France and Italy, whereby the latter was to come into possession of the eastern shore of the Adriatic after the war. The Jugo-Slavs, on the other hand, claimed Dalmatia by virtue of self-determination of peoples, as Slavs predominate in the Dalmatian population. The question was decided by Dalmatia joining the Serb, Croat, and Slovene State, which became Jugo-Slavia. See *JUGO-SLAVIA*.

DALMORES, *dal mo res*, CHARLES (1872-), a French tenor who became an established favorite with American audiences. After completing his musical education at the Paris Conservatoire, he began a public career in Rouen, in 1899, and thereafter was very successful in Belgium, England and Bavaria. Dalmore made his American debut in 1906 as a tenor singer of the Manhattan Opera Company, and later joined the Philadelphia-Chicago organization. His most successful rôles include the tenor parts in *Curwen*, *Samson and Delilah*, *Romeo and Juliet* and *Tales of Hoffman*.

DAM, a bank, or constriction of stone, earth or wood across a stream for the pur-

pose of keeping back the current to give it increased head, for holding back supplies of water, for flooding lands or for rendering the stream above the dam navigable by increased depth. Its material and construction will depend on its situation and the amount of pressure it has to bear. For streams which are broad and deep strong materials are required, usually stone masonry bound in hydraulic cement and a strong framework of timber. The common forms of a dam are either a straight line crossing the stream transversely, one or two straight lines traversing it diagonally, or an arc with its convex side toward the current. See IRRIGATION.

DAMAGES, in law, a money compensation paid to a person for loss or injury sustained by him through the fault of another. It is not necessary that the act should have been a fraudulent one, it is enough that it be illegal, unwarrantable or malicious. It is becoming the common practice in both England and America to allow the damages to cover only the loss sustained, estimated at its real value, together with the expenses incurred in pressing the suit. Formerly it was the usual principle to award damages not only for actual loss, but for "retribution" or "satisfaction," as well.

DAMASCUS, *dam as'kus*, SYRIA, the largest city and since 1930 the capital of the republic of Syria, under a constitution adopted in that year Damascus has the great distinction of being the oldest city in the world that has had a continuous existence. Mention is made of it in the Book of Genesis.

Damascus is beautifully situated on a plain which is covered with gardens and orchards and watered by the Barrada. The streets are narrow, crooked and in parts dilapidated, and, except in the wealthy Moslem quarter, the houses are low, with flat-arched doors. Within, however, there is often a singular contrast, the furniture and decorations being elegant and costly. The chief buildings are the great Mosque and the Citadel. Among the places of historical and traditional interest are the leper hospital in the house of Naaman, the house of Ananias and the place of Saint Paul's conversion. The bazaars are a notable feature of Damascus. In the midst of the bazaars stands the Great Khan, this and thirty inferior khans being used as exchanges, or market places, by the merchants.

Damascus is an important center of trade in European manufactures, it is also a place of considerable manufacturing importance, the principal products being silk, damasks, cotton and other fabrics, tobacco, glass, soap, fine cabinet work and elegant jewelry; but the manufacture of the famous sword blades (see DAMASCUS STEEL) no longer exists. Damascus is one of the holy Moslem cities and it remains typically Oriental. During the many centuries of its history it had been ruled by Israelites, Persians, Greeks, and Romans before it fell to the Turks in 1516, to remain under that yoke until 1918. Population, 194,000.

DAMASCUS STEEL, a kind of steel originally made in Damascus and the East, greatly valued in the making of swords because of its hardness of edge and flexibility. It was made of pure iron and steel of peculiar quality, containing a larger proportion of carbon than ordinary steel. The steel was produced by careful heating, laborious forging, doubling and twisting. See STEEL.

DAMASK, a costly fabric of silk, linen or wool, made by weaving the weft into the warp in such a way as to make figures representing fruit, flowers, leaves and other forms. It gets its name from Damascus, the city where it was first manufactured. Linen damasks are used chiefly for tablecloths and napkins. Damasks of silk and of wool make handsome furniture coverings.

DAMASKEENING, the ornamenting of iron and steel with designs produced by inlaying or incrusting with another metal, such as gold or silver. The pattern is etched on the steel, and the other metal is filled into the etched lines.

DAMOCLES, *dam'okleez*, a courtier of Dionysius, tyrant of Syracuse. Damocles declared one day that he considered the lot of Dionysius the happiest on earth, and Dionysius offered to give him a taste of the glory which he so much envied. While seated at a table surrounded by all the royal appointments, Damocles on looking up was horrified to perceive a sword suspended over his head by a single hair. Dionysius had thus made plain to him the uncertain nature of royal happiness. In current speech the expression, "sword of Damocles," signifies an expected disaster which may come at any time.

DAMON AND PYTHIAS, *mith'i as*, two youths who lived in ancient times in Syracuse, celebrated as models of constant friend

ship. Pythias had been unjustly condemned to death by Dionysius the younger, tyrant of Syracuse; and as he was obliged to leave Syracuse to arrange his affairs, his friend Damon was taken as a pledge that Pythias should return on the day fixed. Pythias, being unexpectedly detained, had great difficulty in reaching Syracuse in time to save Damon from being executed in his place, and Damon made no attempt to escape from his promise. Dionysius was so affected by the proof of their friendship that he pardoned Pythias. The Knights of Pythias, a fraternal order established in the United States, has this incident for its basis (see PYTHIAS, KNIGHTS OF)

DAMROSCH, *dahm'rosh*, LEOPOLD (1832-1885), a German-American musician, the first to establish choral societies in New York. He was graduated in medicine at the University of Berlin and began practice at Posen, but soon abandoned his profession for the study of music and became a concert violinist in 1855. Damrosch later became director of orchestras in Posen and Breslau, and in 1871 went to New York, where he was director of the Arion Society. In 1884 he accomplished his most notable achievement in introducing and maintaining German opera in New York City. He was the composer of numerous cantatas, concertos and songs, and was a frequent contributor to musical magazines.

DAMROSCH, WALTER JOHANNES (1862-), an American musician and orchestra conductor, the son of Leopold Damrosch (which see). His first important position was conductor of the oratorio and symphony societies in New York and assistant conductor of the German opera at the Metropolitan Opera House. In 1900 he conducted German opera in New York and in the following year became conductor of the New York Philharmonic Orchestra. He resigned this post in 1928, then became musical counsel for the National Broadcasting Company.

DAN, a word meaning *judgment*, refers to two ancient characters. 1. One of the sons of Jacob by Bilhah. At the time of the exodus the Danites numbered 62,700 adult males, being then the second tribe in point of numbers. Samson was a member of this tribe. 2. A town in the extreme north of Palestine. This, with Beersheba in the south, gives rise to the expression "from Dan to Beersheba," meaning the land from north to

south, or the entire distance between two places.

DANA, CHARLES ANDERSON (1819-1897), one of America's greatest editors, was born at Hinsdale, N. H. He studied at Harvard, but was obliged to leave after two years, because of ill health. He was a member of the Brook Farm Association and one of the editors of a paper established in its interest. After working for other papers he joined the *New York Tribune* in 1847, on the staff of which he remained for fifteen years. During the latter part of the Civil War he was assistant Secretary of War, and after the close of the war he started a Chicago paper, which, however, was not successful. From 1888 he was editor and part owner of the *New York Sun*, and perhaps more than any other journalist his personality was identified with his newspaper.

DANA, JAMES DWIGHT (1813-1895), an American geologist, born in Utica, N. Y. In 1850 he became professor of natural history at Yale College. He wrote *System of Mineralogy*, *Manual of Mineralogy*, *Coral Reefs and Islands*, *Manual of Geology* and *Text Book of Geology*. Dana did much to place American geology on a scientific basis and also to popularize the subject. He was recognized as the foremost American geologist.

DANA, RICHARD HENRY, JR. (1815-1882), an American lawyer and author, son of Richard Henry Dana, the poet. After being obliged to give up his work at Harvard College, he took a sea voyage around Cape Horn to California and published, as a result of his experiences during the voyage, *Two Years Before the Mast*, one of the best sea stories ever written. He became a lawyer and held various important official positions and was expert in international law.

DANBURY, CONN., one of the county seats of Fairfield County, the other being Bridgeport. It is sixty miles northeast of New York City, on the New York, New Haven & Hartford Railroad, and is famous as being the leading American city in the manufacture of hats. Over thirty factories are given to the manufacture of hats and their accessories. The town also manufactures unnecessary. The town also manufactures underwear, silk and silver-plated ware. It has a state normal school, is the seat of the county agricultural society, and has a public library and two parks. Population, 1920, 18,889, in 1930, 22,261.



DANCING, *dan'sing*, a form of exercise, accompanied almost always by music, in which the participants perform graceful movements in measured time. In its earliest forms among primitive races, dancing was a mode of expressing strong emotions of joy and sorrow, love and rage, and even of the most solemn and impassioned religious feelings; in more civilized forms of human society it becomes a pleasurable form of recreation or

an agreeable spectacle at public entertainments.

Dancing corresponds to a universal primitive instinct in man. It is still practiced by the South Sea Islanders, the forest Indians of Brazil, the Zulus, the negroes of Central Africa and the native Australians, exactly as it was in the earlier stages of every civilized modern race. Ferocious war dances were practiced by savage warriors, as, for example, the North American Indian braves, who worked themselves up into frantic mechanical intoxication, capable of carrying them irresistibly on to victory. The Zulu war dance is still a noble exercise for warriors, like the Pyrrhic dance of the ancient Spartans; and the dancing and whirling dervishes in the East, who work themselves into spasms of physical excitement, are still respected for their devoutness and piety.

Among the ancient historic peoples dancing was generally an expression of religious, patriotic or military feeling, as in the case of the dance of David before the ark, or the Pyrrhic dance of the Greeks. The Romans, however, like the Orientals, hired slaves to do the dancing. France took the lead in inventing modern dances. Among some of these dances were the graceful *minuet*, the favorite for a century, the *quadrille*, the *galop*, introduced from Germany, the *cotillon*, fashionable under Charles X; the *polka*, first danced at Odeon in 1840 by a dancing master from Prague; the *schottisch*, also of Bohemian origin, first brought out in Paris in 1844; the *lancers*, introduced by Laborde in 1836, and the *waltz*, introduced into European ballrooms in 1795. This graceful

dance will probably never lose its popularity. Another favorite is the *two-step*, a livelier dance than the waltz and one adapted to march time. It is of American origin.

Characteristic of particular races or merely of classes of people are such forms of the dance as the *Scottish reel*, *Highland fling* and *strathspey*, the Irish *jig*; the negro *break-downs*; sailors' *hornpipes*, and the like.

So-Called "New" Dances. Early in the present century a dance craze swept over America and Europe, following the introduction into San Francisco of the turkey trot. For a time people were dancing this and others like it—the bunny hug, grizzly bear, Texas Tommy, etc.—but the vulgarity of these dances caused a reaction against them, and others more refined in character became popular. The latter included the tango, one-step and fox trot, based on walking steps, and the hesitation and waltz canter, based on the waltz.

Other variations of the dance have had their period of popular favor, the general tendency being against those forms which are deemed vulgar or which require unusual physical exertion.

DAN'DELION, a plant which carpets lawns and meadows with bright yellow in the spring, summer and fall. The leaves are toothed, radiating from the crown of the very long root, and the name is from the French for *tooth of a lion*. The dandelion blooms profusely, bearing many slender stalks, each surmounted by one large, bright yellow head of many small flowers which mature into a beautiful white ball of feathered fruits. These are transported far and wide by the wind. The whole plant is full of a milky and bitter juice. Some species have powerful medicinal properties, and the young leaves of all are often used for greens and salads.



DANDELION

DAN'DRUFF, the visible effect of a disease of the scalp. It appears as a white, scaly substance which loosens from the

scalp in small particles and either adheres to the hair or falls on the clothing. The presence of dandruff gives rather positive assurance that in time the disease will cause the hair gradually to fall out. The best remedy is a vigorous daily scalp massage and an occasional shampoo, in which pure soap is used.

DANIEL, the prophet, a contemporary of Ezekiel, was born of a distinguished Hebrew family. His story is related in these volumes in the article **BIBLE**, subhead *Bible Stories*.

DANIEL CELL, an electric cell especially designed to give a small but continuous current. The modern Daniell cell consists of a glass jar in which is placed a porous cup containing a zinc rod or plate. Outside the cup is a copper cylinder with openings to allow the liquid to circulate freely. The porous cup is almost filled with dilute sulphuric acid and a saturated solution of copper sulphate is placed in the jar (outside the porous cup). A small vessel of solid copper sulphate is also placed in the jar to maintain the concentration of the solution. Some of the zinc goes into solution in the sulphuric acid causing the zinc electrode to become negatively charged. When the copper electrode is connected to the zinc this charge causes a current to flow from the copper to the zinc. At the same time copper from the copper sulphate solution is deposited on the copper electrode. Since copper is a good conductor it does not interfere with the current, as does the hydrogen which is deposited in a simple cell, and the flow of current continues undiminished for several weeks. During this time the chemical action of the cell gradually uses up the zinc and copper sulphate in generating the current. Daniell cells in various forms are widely used for producing current for telegraph stations and other devices which require a continuous current.

DANISH WEST INDIES, the name formerly applied to the Virgin Islands of the United States (which see).

DANTE ALIGHIERI, *dahn'ta ah le gya're*, (1265-1321), Italy's most famous poet, and one of the greatest who ever lived. He was born in Florence of a family which probably belonged to the lower nobility.

Of his youth and education nothing definite is known, although it may be that he studied with the learned Brunetto Latini. He was but a boy of nine years when he first

saw Beatrice Portinari, and the love she awakened in him he has described in that record of his early years, the *New Life*, as well as in his later great work, the *Divine Comedy*. In 1291, the year after the death of Beatrice, Dante married Gemma Donati, by whom he had several children. Soon after this time the Guelphs in Florence became divided into the rival factions of Bianchi and Neri (Whites and Blacks), the latter an extreme Papal party, the former a moderate party which wished for reconciliation with the Ghibellines. Dante's



Dante's sympathies were with the Bianchi, and when, in 1302, the opposite party gained control, Dante was banished with many of his fellows. The poet remained an exile to the end of his life; and his history during this time is semi-mythical. He is said to have visited many cities, Arezzo, Bologna, Siena and even Paris, and in 1320 he certainly stayed at Ravenna, with his friend Guido da Polenta. He was buried at Ravenna, where his bones still lie.

Dante's great poem, the *Divine Comedy*, written in great part, if not altogether, during his exile, is divided into three parts, entitled *Hell*, *Purgatory* and *Paradise*. The title *Comedy* was given to it, in accordance with the standards of the time, because it begins with horrible scenes and ends cheerfully. The epithet *Divine* was added by others because of its lofty character.

The "*Divine Comedy*," The poet dreams that he has wandered into a dusky forest, when the shade of Vergil appears and offers to conduct him through hell and purgatory. Further the pagan poet may not go, but Beatrice herself will lead him through paradise. Dante with marvelous imaginative power gives brief life histories of the famous guilty ones—Pope and Ghibelline, Italian lord and lady—often in his severe style compressing the story into two or three lines, but always picturing guilt and punishment with passionate force, subtle insight and intense religious faith. From hell, the poet, still in the company of Vergil, ascends to purgatory, where the scenes are

similar, though the punishments are only temporary. In the earthly paradise above purgatory, Dante beholds Beatrice in a scene of surpassing magnificence, ascends with her into the celestial paradise, and after roaming over seven spheres he reaches the eighth, where he beholds "the glorious company, which surrounds the triumphant Redeemer." In the ninth Dante feels himself in the presence of the Divine essence, and sees the souls of the blessed on thrones in a circle of infinite magnitude. The Deity himself, in the tenth, he cannot see for excess of light. Dante's great poem ranks with the world's greatest epics, and has been translated into many languages.

DANTON, *dahn' tohN'*, GEORGES JACQUES (1759-1794), one of the leaders in the French Revolution. He was foremost in organizing and conducting the attack on the Tuileries, August 10, 1792, voted for the capital punishment of all returning aristocrats and for the death of the king, and with Robespierre brought Hébert and his followers to the scaffold. Robespierre succeeded in having Danton denounced and thrown into prison because he had dared to counsel moderation, and he was afterward condemned by the revolutionary tribunal as an accomplice in a conspiracy for the restoration of monarchy, and was executed.

DANT'ZIO. See **DANZIG**.

DANUBE, the chief commercial river in Europe, second only to the Volga in length and extent of drainage basin. It originates in two small streams, rising in the Black Forest, in Baden, and uniting at Donaueschingen. The direct distance from source to mouth of the Danube is about 1,000 miles, and its total length, including windings, about 1,750 miles. From its source the Danube flows in a northeasterly direction to Ulm, in Württemberg, where it becomes navigable for vessels of 100 tons; then to Ratisbon, in Bavaria, where it becomes navigable for steamers. Here it turns in a southeasterly direction, entering Austria at Passau. It passes Vienna, then Budapest, above which it suddenly turns due south, holding this direction until joined by the Drave, after which it runs southeast, entering Yugoslavia and passing Belgrade. Continuing its course eastward, it forms for a long distance the boundary line between Rumania and Bulgaria. At Silistria it once more turns northward, then eastward, and flowing

through Rumania, it falls into the Black Sea by three different outlets.

The Danube is noted for beautiful scenery along its banks, which in places rivals that of the Rhine. Its value as a commercial route has been enhanced by extensive construction work. The celebrated Iron Gate (which see), through which the river flows across the South Carpathians, has been rendered navigable, and shipping passing through it is regulated by an international commission. There is canal communication with the Rhine, and the Sulina channel mouth has been deepened to accommodate the largest ocean craft.

DANVILLE, *ILk*, founded in 1827, is the county seat of Vermilion County, and the center of a rich coal-mining district. It is 123 miles south of Chicago, on the Vermilion River, and on the Wabash, the Chicago & Eastern Illinois, New York Central, and Big Four railroads. There is an airport. Its industries center largely around the coal fields, but the city has one of the largest brick plants in the world, and there are important zinc works. The city has an imposing Federal building, and a fine county building, also a Y M C A and an Elks' Home, a Carnegie Library and two hospitals. The commission plan of government prevails. Population, 1930, 36,765.

DANVILLE, *VA*, a city of Pittsylvania County, 140 miles southwest of Richmond, on the Dan River and on the Southern and Danville Western railroads. The city has a beautiful location, is in a region producing a very fine quality of tobacco, is the second largest leaf tobacco market in America and contains about forty tobacco factories. The river furnishes good water power, and there are large cotton works, flour and grist mills, knitting mills, overall factories, a cheroot factory and other enterprises. It is the seat of Roanoke Institute, Randolph-Macon Institute and Danville School for Boys. The place was settled in 1792. It was for a short time the seat of the government of the Southern Confederacy in 1865. Population, 1920, 21,539; in 1930, 22,247, a gain of 9 per cent.

DANZIG, or **DANTZIG**, *dahn'tsiK*, a free city, internationalized in 1919, by order of the peace conference. It was formerly the capital of the province of West Prussia, 255 miles northeast of Berlin, on the Vistula, about three miles from the Baltic Sea.

Among the principal buildings are the Dom or Cathedral, begun in 1343; the Church of Saint Catharine; the fine old Rathaus; the exchange; the arsenal; an observatory; three monasteries; two synagogues and two theaters. The prosperity of the town is founded chiefly on its transit trade. The principal trade is in grain, timber and sugar. There were formerly German government establishments for the manufacture of arms and ammunition.

Poland sought more direct port control than was possible at the Free City of Danzig, so it established a new port entirely in Polish territory a few miles west, at Gdynia. Later,

the country presents beautiful scenery, rising gradually upward from the sea to the range of Mount Ida; the European side is steep and rugged, but is densely peopled and highly cultivated. On both shores are numerous forts and powerful batteries. Two castles on the opposite shores are near the sites of ancient Sestos and Abydos, and recall the story of Hero and Leander (see HERO).

By a treaty made in 1841 between the five great powers and Turkey, confirmed by the Peace of Paris in 1856, it was decreed that no foreign man-of-war should pass the strait without the express permission of the Tur-



THE REGION OF THE DARDANELLES

political conditions between the Free City and Poland were on a more friendly basis, for Poles comprise a large element of the people. Population of the city of Danzig, 262,600; of the entire Danzig Corridor, 497,500, in 1933.

DAPHNE, *daf'ne*, in classic mythology, daughter of the river god Penens. Apollo wooed her in vain, and one day, while he was pursuing her through the woods, she called on her father to change her form, as she found herself exhausted. Penens then changed her into a laurel tree, which was thereafter sacred to Apollo (see LAUREL). There is a famous statue representing this myth in the Villa Borghese, Rome, the work of Bernini.

DARDANELLES, *dahr da nels'*, the ancient HELLESPOINT, is a narrow channel which connects the Sea of Marmora with the Aegean Sea and is a short part of the boundary separating Europe from Asia. It is about forty-seven miles in length and varies in breadth from one to four miles. A rapid current, often much increased by winds, runs southward. On the Asiatic side

kish government. During the World War the allies made desperate attempts to force a passage through the Dardanelles to Constantinople. In February and March, 1915, an allied fleet bombarded the forts at the entrance, and in April an army was landed on the Gallipoli Peninsula, but with heavy losses. The heroism of the soldiers and the sacrifice of thousands of lives were not enough to overcome the Turks, and after eight terrible months the allied forces withdrew from the peninsula. On the surrender of Turkey, in 1918, the Allies occupied the strait temporarily, and in 1920 it was internationalized—opened freely to all nations. In 1936, however, the Turks demanded control again, much to the disquietude of the great powers.

DARIEN, *dari'en*, GULF OF, a gulf of the Caribbean Sea, at the north extremity of South America, between the Isthmus of Panama and the mainland. The chief river flowing into it is the Atrato. Columbus reached the gulf on his fourth voyage in 1502. The Isthmus of Panama was formerly called Isthmus of Darien.

DARIEN SCHEME, a celebrated financial project set afloat by a Scotchman, William Patterson, whose purpose was to form a settlement on each side of the Isthmus of Darien (now Isthmus of Panama), in order to control the trade between the eastern and western hemispheres. Nearly \$4,000,000 was subscribed, fully half of it in Scotland, and in 1698 1,200 Scotch colonists sailed for the isthmus. Disease and famine, however, caused them to desert their settlement and return to Scotland in June, 1699. Two other companies of about the same size also attempted to establish settlements at Darien, with equally unfortunate results.

DARIUS I (550-485 B. C.), a Persian king who attained the throne in 521 B. C. One of his first acts was to divide his empire into twenty satrapies, or provinces, with a governor over each. He reduced the revolted city of Babylon, and led an expedition of 700,000 men against the Scythians on the Danube. The Greeks had aided the Ionians in their struggle to free themselves from Persia, and Darius therefore sent an army under Mardonius to invade Greece. But the ships of Mardonius were destroyed by a storm in doubling Mount Athos, and his army was cut to pieces by the Thracians. Darius, however, fitted out a second expedition, which was met on the plains of Marathon by an Athenian army under Miltiades and completely defeated (490 B. C.). Darius had determined on a third expedition, when he died in 485. See **MARATHON**.

DARIUS III, the twelfth and last king of Persia. He ascended the throne in 336 B. C., when the kingdom had been weakened by luxury and the tyranny of his governors and could not resist the attacks of Alexander of Macedon; the army of Darius was totally routed on the banks of the Granicus, in Asia Minor. Darius then hastened to meet Alexander in the mountainous region of Cilicia and was a second time totally defeated near the Issus. Two years afterward, all proposals for peace having been rejected by Alexander, Darius collected another army, met the Macedonian forces between Arbela and Gaugamela, and was again routed. Alexander captured Susa, the capital, and Persepolis, and reduced all Persia. Meanwhile, Darius was collecting another army at Ecbatana in Media, when a traitorous conspiracy was formed against him, by which he lost his life, in 330 B. C.

DARK AGES, a term used to designate the period from about the fall of the Roman Empire, in 476, to the revival of learning, in the twelfth century. Sometimes the words are understood to mean the entire Middle Ages, but usually only the earlier part of that period is so designated. See **MIDDLE AGES**.

DARLING, GRACE HORSLEY (1815-1842), a celebrated English heroine. In 1838 the steamer *Forfarshire*, with forty-one passengers on board, besides her crew, became disabled off the Farne Islands during a storm and was thrown on a rock, where it broke in two, part of the crew and passengers being left clinging to the wreck. The next morning William Darling observed them from Longstone lighthouse, about a mile distant, but he shrank from attempting to reach the wreck in an open boat in such a raging sea. His daughter Grace, however, implored him to make the attempt and let her accompany him. At last he consented, and father and daughter reached the wreck and succeeded in rescuing nine sufferers. The news of the heroic deed soon spread, and the brave girl received testimonials from all quarters. A purse of \$3,500 was publicly subscribed and presented to her. Four years later she died of consumption, honored throughout the world.

DARMSTADT, *dahrm'stadt*, GERMANY, capital of the former grand duchy of Hesse, is situated fifteen miles south of Frankfurt-on-the-Main. Among the remarkable buildings are the old grand-ducal palace, containing one of the largest libraries in Germany, the Catholic church, and the Rathaus, or townhall, built in 1580. Darmstadt is a busy manufacturing town. There are iron foundries, breweries, machine shops, tobacco factories, carpet works, and manufactories of scientific instruments, chemicals and playing cards. The town is also an important railway center. In 1830 it secured municipal rights, and in 1867 it became the capital of Hesse. It was burned by the French in the seventeenth century, but afterwards rapidly rose in importance. Population, 1933, 93,000.

DARNEL, the popular name of a species of poisonous grass. It appears to be the tares of Scripture. It is said to have narcotic and stupefying effects, but recent researches have cast some doubt on its reported injurious qualities. It is met with in corn

fields, and is now naturalized in North America.

DARNING NEEDLE. See **DRAGON FLY.**

DARNLEY, HENRY STUART, Lord (1545-1567), the second husband of Mary Queen of Scots. He was a son of the Earl of Lennox and Lady Margaret Douglas, a niece of Henry VIII. In 1565 he was married to Mary Queen of Scots. It was an unfortunate match; Mary was disgusted at his coarseness and could not long conceal her contempt. His part in the murder of Rizzio angered Mary still further, and when, on February 9, 1567, the house in which he lay recovering from an illness was blown up by gunpowder, Mary was suspected of complicity in the crime. See **MARY STUART.**

DARTER, or SNAKE BIRD, the latter name applied because of the length of the neck, is a web-footed bird related to the cormorant and found near the eastern coasts of tropical America and the western coast of tropical Africa, as well as in Australia. It is the habit of these birds to perch on



DARTER

trees by the water side and, after hovering an instant over the water, suddenly to dart at their prey with unerring aim. Their nests are rudely constructed in trees, and the eggs are bluish in color.

DARTMOUTH, *dahrt'muth*, NOVA SCOTIA, on Halifax Harbor opposite Halifax, and on the Intercolonial Railway. The industries include cordage works, a sugar refinery, rolling mills, a chocolate factory, ship repairing and boiler works, and extensive ship yards. The Imperial Oil Company has a large plant here. The town has six churches and several banks. Population, 1921, 7,899; in 1931, 9,100.

DARTMOUTH COLLEGE, one of the earliest and best known of American colleges,

situated at Hanover, N. H. The college is the outgrowth of an Indian school which was opened in 1754 and was founded by Rev. Eleazar Wheelock. The institution was named from the Earl of Dartmouth, who was one of the principal contributors and the first president of the board of trustees. The college began its existence in the midst of the wilderness, and the only buildings for several years were log huts, but it continued to increase in numbers and influence until it became one of the leading colleges of the country. Later, a religious controversy caused the state legislature to create a new corporation, which, without consent of the old board of trustees, assumed control of the college. This led to what is known as the Dartmouth College Case (see below). The college still remains an institution for men only. It confers degrees in arts and letters, science, the Amos Tuck School of Administration and Finance, and civil engineering. The student body numbers about 2,500, the faculty about 250. The library contains more than 400,000 volumes.

Dartmouth College Case. Dartmouth College was founded by a charter granted by George III in 1769. When the independence of the United States was established, the state of New Hampshire assumed the position occupied by the throne under the colonial government. In 1816 the legislature created a new corporation for the college, making certain changes in its management. The college appealed to the courts, but lost its suit, and then appealed to the United States Supreme Court where its case was argued by Daniel Webster. The Supreme Court, in a decision handed down by Chief Justice Marshall in 1819, declared that the legislature did not have authority to legislate the old charter out of existence, or to pass laws violating its provisions, by reason of the clause in the United States Constitution which establishes the inviolability of contracts.

DARWIN, CHARLES ROBERT (1809-1882), one of the world's greatest naturalists, the leading scientist of the nineteenth century, was born in Shrewsbury, England. He early devoted himself to the study of natural history, and in 1831 was appointed naturalist to the surveying voyage of H. M. S. *Beagle*. Darwin came home with rich stores of knowledge, part of which he soon gave to the public in various works. In 1859 his name

attained its great celebrity by the publication of *The Origin of Species by Means of Natural Selection*. This work, scouted and derided though it was at first in certain quarters, may be said to have worked nothing less than a revolution in biological science. In it for the first time was given a full exposition of the theory of evolution as applied



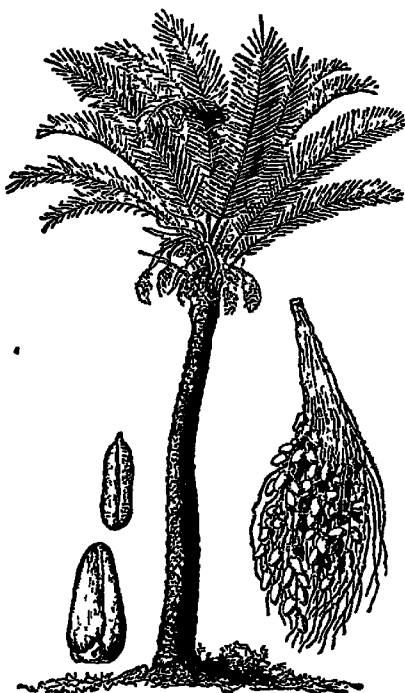
CHARLES DARWIN

to plants and animals, the origin of species being explained on the hypothesis of natural selection. This theory is now generally accepted by the prominent scientists, though modified and improved in many of its details. The rest of his works are largely based on the material he had accumulated for the elaboration of this great theory. The principal ones are a treatise on the *Fertilization of Orchids*; *Domesticated Animals and Cultivated Plants*; *Descent of Man and Variation in Relation to Sex*; *The Expression of the Emotions in Man and Animals*; *Movements and Habits of Climbing Plants*; *Insectivorous Plants*; *Cross and Self Fertilization*; *The Power of Movement in Plants*, and *The Formation of Vegetable Mold*. See EVOLUTION.

DASKAM, JOSEPHINE DODGE See BACON, JOSEPHINE DASKAM

DATE, the fruit of the date palm, or the tree itself. The fruit is used extensively as an article of food by the natives of Northern Africa and of some countries of Asia. It consists of a fleshy coat, separable into three portions, and covering a hard, horny seed. Next to the coconut palm, the date is unquestionably the most interesting and useful of the palms. Its stem shoots up to the height of fifty or sixty feet, without branch or division, and is of nearly the same thickness throughout its length. From the summit it throws out a magnificent crown of large, feather-shaped leaves, besides a number of stalks, each of which in the female plant bears a bunch of from 180 to 200 dates, each bunch weighing from twenty to twenty-five pounds. The fruit is eaten fresh or dried. Cakes of dates pounded and kneaded together are the food of the

Arabs who traverse the deserts. A liquor resembling wine is made from dates by fer-



DATE PALM

mentation. Dates are now being cultivated in California, Arizona and other warm-weather states with considerable success, a large industry is developing.

DAUDET, *dodá*, ALPHONSE (1840-1897), a French novelist, born at Nîmes. He went to Paris in 1857 to seek his fortune but his collections of poems failed to win any attention, and his plays met with little better reception. When he discovered his powers as a story-teller, however, his success was assured. The volumes of short stories, *Letters from My Mill* and *Monday Tales*, established his reputation, which was rendered more secure by each novel which he published. *Numa Roumestan* and *The Nabob* are probably his greatest works, although many readers find *Tartarin of Tarascon* the most attractive. Daudet himself regarded *Sapho* as the best of his writings, and it has become widely known through dramatization.

DAUGHTERS OF THE AMERICAN REVOLUTION, a patriotic national society, organized in Washington, D. C., in 1890. Only those women whose ancestors fought upon the American side in the Revolutionary War are admitted to membership. Its purpose is the fostering of reverence for the achievements of the Revolutionary heroes and the collection of relics and the erection of monuments. There are chapters in almost all the states and in Canada, Hawaii and Alaska. Its membership of 171,000 is divided among 1,500 local chapters. The society owns a beautiful memorial hall in Washington, completed in 1910.

DAUGHTERS OF THE CONFEDERACY, UNITED. See **CONFEDERACY, UNITED DAUGHTERS OF THE.**

DAUPHIN, *daw'fin*, the title given to the eldest sons of the former kings of France. The name was assumed toward the middle of the ninth century by the lord of Dauphiny, which province was bequeathed by Humbert II to the King of France in 1349, on condition that the heir of the throne should bear the title of Dauphin of Vienne and should govern the province.

DAVENPORT, FANNY LILY GIPSY (1850-1898), an American actress, born in London, but educated in Boston. She was only seven years old when she first appeared on the stage and was but twelve when she made her formal debut in *Faint Heart Never Won Fair Lady*. After playing for a short time in Mrs. Drew's theater in Philadelphia, she became connected with Augustin Daly's company in New York. Among her most famous portrayals were the leading rôles in *Fedora*, *Cleopatra* and *La Tosca*.

DAVENPORT, Iowa, the county seat of Scott County, on the Mississippi River, 330 miles above Saint Louis, 183 miles west of Chicago, and opposite Rock Island, Ill. It is on the Chicago, Rock Island & Pacific, the Chicago, Milwaukee, Saint Paul, & Pacific, the Chicago, Burlington & Quincy and other railroads of local importance.

The city is built upon the sides of a bluff and has a beautiful location overlooking a wide extent of country. It is connected with Rock Island by a railroad bridge and a combined wagon and railroad bridge. The important buildings include four hospitals, a Carnegie Library, a commercial club building, the fine Blackhawk Hotel and a number of fine office buildings. Among the educa-

tional institutions are the Academy of the Immaculate Conception, Saint Ambrose College, Saint Katherine's Hall and Palmer's Chiropractic College. The leading church edifices are the Protestant Episcopal and Roman Catholic cathedrals, Saint John's Methodist Church and the Kirkwood Presbyterian Church. The Iowa Soldiers' Orphans' Home is also located here. The city has a large trade in farm produce and is the seat of a number of extensive industries, including meat packing, manufactories of flour, lumber, residences ready-cut, farming implements and machinery, locomotives, pumps, steel cars and soap. In the river opposite the city is a government arsenal. Davenport was founded in 1833, and was named for Colonel George Davenport, leader of the company forming the first settlement. It was incorporated as a town in 1838 and as a city in 1851. Population, 1930, 60,751.

DAVID, king of Israel, the youngest son of Jesse, a citizen of Bethlehem, and descended through Boaz from the ancient princes of Judah (*I and II Sam*; *I Chron.*). He reigned from 1055 B. C. to 1015 B. C., according to the usual chronology, but recent investigations put the dates from thirty to fifty years later. Under David the empire of the Israelites rose to the height of its power, and his reign has always been looked on by the Jews as the golden age of their nation's history. Much of David's history is told in detail in the subhead *Bible Stories*, under the heading *Bible*.

DAVIES, LOUIS HENRY, Sir (1845-1924), a Canadian statesman and jurist, born at Charlottetown, Prince Edward Island. He was educated at the Prince of Wales College in that city and in London, England. Davies began the practice of law in his native city in 1866 and became one of the leaders of his profession. In 1869 and 1871-72 he was solicitor-general of the province; 1873-76, leader of the opposition; 1876-79 premier and attorney-general. He was elected to the Dominion House of Commons as a Liberal in 1882 and continuously returned until 1901, when he was appointed judge of the Supreme Court of Canada. He was counsel for Great Britain before the International Fisheries Arbitration Commission at Halifax in 1877, joint delegate with Sir Wilfrid Laurier to Washington for the settlement of the Bering Sea controversy in 1897, and a member of the Joint High Commission for the settlement of

all disputes between Canada and the United States From 1896 to 1901 he was Minister of Marine He became Chief Justice in 1918.

DAVIS, DAVID (1815-1886), one of America's greatest jurists of the Civil War period, was born in Cecil County, Md He was graduated from Kenyon College, Ohio, studied law in Massachusetts and Connecticut, and removed to Illinois in 1835. In 1844 he was a member of the state legislature, and in 1848 was made United States circuit judge In October, 1862, President Lincoln appointed him Associate Justice of the Supreme Court Judge Davis was nominated by the labor reformers for President in 1872, but he usually affiliated with the Democratic party. In March, 1877, he resigned to enter the United States Senate, where he remained until 1883.



D**AVIS, JEFFERSON** (1808-1889), an American statesman, president of the Confederate States of America, whose memory is cherished in the South with unceasing devotion Lake Lee, he typified in a very definite way the ideals which inspired those who fought for the Confederacy Jefferson Davis was born on June 3, 1808, in Christian (later Todd) County, Kentucky At an early

age he went with his parents to Mississippi, where he received his preliminary education. He later entered West Point Military Academy, graduating in 1828, and for seven years he saw important service on the frontier After engaging for several years in cotton planting, he was elected to Congress in 1845, where he became an ardent follower of Calhoun

At the commencement of the Mexican War Davis left Congress and entered the contest as colonel of a regiment, and performed distinguished service He entered the Senate in 1847, and became the leader of the Southern Party in the slavery and States' rights controversy, frequently coming into opposition with Stephen A Douglas Davis was Secretary of War during Pierce's administration, and while holding this position introduced several marked improvements in military tactics, coast defense, armament and

transportation Upon the secession of Mississippi, he retired from the Senate, delivering a notable farewell address, and in the same year was elected president of the Confederate States.

During the war he acted with good judgment, dignity and devotion to principle and was especially anxious to mitigate the suffering and sorrow caused by the war. He was taken prisoner soon after the fall of Richmond and was confined in Fortress Monroe for two years Released on bail in 1867, through the efforts of Horace Greeley and other Northerners, he was given full



JEFFERSON DAVIS liberty by the general amnesty of 1868. During his last years Davis resided in Memphis and Mississippi, dying in New Orleans In 1881 he published *The Rise and Fall of the Confederate Government*, giving his view of the controversy. His remains were removed from New Orleans and interred at Richmond in 1893, where a monument has been erected in his honor.

DAVIS, JOHN WILLIAM (1873-), lawyer, statesman, and diplomat, in 1924 the Democratic nominee for President of the United States, was born in Clarksburg, W Va He was graduated from the departments of liberal arts and law of Washington and Lee University, and taught law there for a year Private law practice followed, and led to public service Successively Davis was a member of Congress for two terms (1910-1914), then solicitor-general of the United States In 1918 he was appointed ambassador to Great Britain, but resigned in 1921 because of the heavy financial burden imposed. The Democratic national convention of 1924 battled for nearly three weeks to select a Presidential nominee. On the 103rd ballot Davis was named, and to placate William J. Bryan, who was opposed to Davis, his brother, Governor Charles W. Bryan of Nebraska, was nominated for Vice-President The ticket was defeated by Coolidge, and Davis returned to a lucrative law practice

DAVIS, REBECCA HARDING (1831-1910), an American novelist. the first writer to

bring the labor question into American fiction. Mrs. Davis was born in Washington, Pa. She first became known for the gloomy power of a story, *Life in the Iron Mills*, published (1861) in the *Atlantic Monthly*. After her marriage to L. Clarke Davis, editor of the *Philadelphia Inquirer*, much of her brilliant talent went into journalistic work which has not been preserved. Among her novels are *Dallas Galbraith*, *Kent Hampden* and *A Law unto Herself*.

DAVIS, RICHARD HARDING (1864-1916), a very popular American novelist, short-story writer and journalist, the son of Rebecca Harding Davis, was born at Philadelphia. He was educated at Lehigh and Johns Hopkins universities, and began literary work as a newspaper reporter in Philadelphia. After serving for a time on the staff of the *New York Evening Sun*, he became managing editor of *Harper's Weekly*. This position he held but a short time. *Gallegher and Other Stories*, published in 1891, first gained him wide attention. Among his later popular and successful books were *Van Bibber and Others*, *Soldiers of Fortune*, *Ransom's Folly*, and *Cuba in War Time*.

He gained fame as a war correspondent; his reports from the battle fronts of Europe (1914-1916) were classics.

DAVIS STRAIT, a narrow sea which separates Greenland from Baffin Land, and unites Baffin Bay with the Atlantic Ocean. It is from 180 to 500 miles wide and was discovered in 1585 by John Davis, after whom it was named.

DAVY, HUMPHRY, Sir (1778-1829), a distinguished English chemist. He was appointed professor of chemistry in the Royal Institution at the age of twenty-four. In 1803 he was chosen a member of the Royal Society. His discoveries with the galvanic battery, his decomposition of the earths and alkalis and the ascertaining of their metallic bases gave him a worldwide reputation. From his investigation of firedamp in mines, he was led to the invention of a safety lamp, which has rendered the mines comparatively free from explosions and thus prevented the death of thousands of workmen.

DAWES, CHARLES GATES (1865-), financier and publicist. He was born in Marietta, Ohio, graduated from Marietta College in 1884, and from the Cincinnati Law School in 1886. He practiced law in Lincoln, Neb. until 1894. Business interests led him

to Chicago, where he organized, in 1902, the Central Trust Co. of Illinois. He performed conspicuous public service as Comptroller of the Currency, 1897-1902; as chairman of the General Purchasing Board of the American Army in France, 1917-1918; as first Director of the Federal Budget, 1921; and as Chairman of an international committee of experts on German reparations, 1923-1924. He was elected Vice-President of the United States on the Republican ticket in 1924.

In 1929 he was appointed United States Ambassador to Great Britain; he resigned in 1932 and reentered the banking business.

DAWSON, GEORGE MERCER (1849-1901), a Canadian geologist and explorer, born in Truro, N. S. He became a member of the staff of the Geological Survey in 1875, and was its director in 1895. He explored a large portion of the western country and made known its mineral resources. He was a member of the Bering Sea Commission.

DAWSON, JOHN WILLIAM, Sir, (1820-1899), a Canadian geologist and educator. He received his education at Edinburgh University and at an early age turned his attention to geology. In 1842 he accompanied Sir Charles Lyell on an expedition to examine the geology of Nova Scotia. In 1855 he was made principal and professor of geology in McGill University, Montreal, and later vice-chancellor. Among his many contributions to the literature on science are *Acadian Geology*; *The Story of the Earth and Man*; *The Origin of the World*; *Egypt and Syria*; *Modern Ideas of Evolution*, and *The Change of Life in Geological Time*.

DAWSON, YUKON TERRITORY, is a city in Canada, the capital of the district, on the right bank of the Yukon River, 330 miles northwest of Skagway. The river is open to navigation from June 1 to October 15. There are several churches, schools, hotels and theaters, and the town is lighted by electricity. Dawson is the center of the Klondike gold mining region; its origin dates from the discovery of gold on Bonanza Creek in 1896. Coal deposits have been found nearby. Population, 1931, 819.

DAY, the time occupied by the revolution of the earth on its axis, embracing the period of darkness as well as the interval of daylight. The day in the latter sense may be measured in more than one way. If we measure it by the apparent movement of the stars, caused by the rotation of the earth on

its axis, we must call day the period between the time when a star is on the meridian and when it again returns to the meridian, this is a *sidereal* day. It is uniformly equal to 23 hours, 56 minutes, 4 098 seconds. But more important than this is the *solar* day, or the interval between two passages of the sun across the meridian of any place. The latter is about four minutes longer than the sidereal day, owing to the revolution of the earth round the sun, and it is not of uniform length, owing to the varying speed at which the earth moves in its orbit and to the obliquity of the ecliptic. For convenience, an average length of the solar day is taken, and this gives us the *mean solar* or *civil* day of twenty-four hours, the difference between which and the actual solar ray at any time is the *equation of time*.

The length of the days and nights at any place varies with the latitude and season of the year, owing to the inclination of the earth's axis. In the first place, the days and nights are equal all over the world on the 21st of March and the 21st of September, which dates are called the *vernal* (spring) and *autumnal equinoxes*. Again, the days and nights are always of equal length at the equator, which, for this reason, is sometimes called the *equinoctial* line. With these exceptions, we find the difference between the duration of the day and the night varying more and more as we recede from the equator.

The word *day* is also applied in popular speech to the period of time when the sun is above the horizon. In this sense it is used in distinction to night.

The Babylonians began the day at sunrise; the Jews at sunset; the Egyptians and Romans at midnight, as do most modern peoples. The civil day in most countries is divided into two portions of twelve hours each. The abbreviations P. M. (post meridiem), afternoon, and A. M. (ante meridiem), forenoon, indicate these divisions. The Italians in some places reckon the day from sunset to sunset and enumerate the hours up to twenty-four; the Chinese divide it into twelve parts of two hours each. For astronomical purposes the day is divided into twenty-four hours, instead of two parts of twelve hours. Formerly the English day began at noon, but since January 1, 1885, the day of twenty-four hours begins at midnight at Greenwich observatory; and this

reckoning is now generally adopted for astronomical purposes throughout the world.

Varying Lengths of Days. At the equator the days and nights are of equal length. In the higher latitudes variation becomes marked as the poles are approached. In the table below, the daylight period at different latitudes is shown on the longest and shortest days of the year, June 21 and December 21:

LATITUDE	LONGEST DAY JUNE 21	SHORTEST DAY DECEMBER 21
10°	12 hours 35 min	11 hours 25 min
20°	12 hours 13 min	10 hours 47 min.
30°	12 hours 56 min	10 hours 4 min.
40°	14 hours 51 min	9 hours 9 min
50°	16 hours 9 min	7 hours 51 min
60°	18 hours 30 min	5 hours 30 min

At the poles there is daylight for six months, followed by six months of darkness.

DAYLIGHT SAVING, a popular plan for conserving daylight, thus giving workers in summer additional daylight hours for recreation. Under the law, as operative for years in Europe and Canada, and in the United States for 1918, clocks and watches were set ahead one hour at midnight on the last Sunday in March and set back an hour on the last Sunday in October. Clock time was observed and little difficulty resulted. Rural opposition to a daylight saving law in the United States brought its repeal after one year's trial. Many cities, however, have adopted it independently for the warmer months,—April to October.

DAY LILY, the popular name for a genus of lilies, natives of temperate Asia and Eastern Europe, two species of which are grown in gardens. They have long leaves, growing from the ground, and a branched stem with large, fragrant, white blossoms, the segments of which are united into a tube. The blossoms live only from sunrise to sunset.

DAYTON, OHIO, one of America's most progressive cities, is the county seat of Montgomery County, on the Great Miami River, sixty miles northeast of Cincinnati, on the Cleveland, Cincinnati, Chicago & Saint Louis, the Erie, the Pennsylvania and the Baltimore & Ohio railroads. The city has a beautiful location in the fertile Miami Valley. From the main business portion, the land rises to heights of from 100 to 400 feet, and on these elevations are some of the fine residence sections. Van Cleave Park, along the river, where the first settlers landed, contains the first house built in Dayton, which

now serves as an historical museum. There is a fine soldiers' monument on Main Street near the river bridge. Spanning the river are twelve bridges, three of which are beautiful, wide, arched structures of concrete. On an elevation adjoining the city at the west is the central branch of the National Soldiers' Home, which occupies beautiful grounds of about 600 acres.

Dayton was the home of the Wright Brothers, pioneers in aviation, in their honor, Wright Field of 5,000 acres, eight miles east of the city, has been established for aeronautical research for the U. S. Army Air Service. It also provides two large landing fields. The Dayton Airport, north of the city, is a commercial field.

The educational institutions of Dayton include the University of Dayton (Catholic), Bonebrake Theological Seminary (United Brethren), and Central Theological Seminary (Reformed). There are four large hospitals in and near the city. The Dayton public library and museum and the Dayton art institute provide other cultural opportunities. The city's parks and playgrounds are beautiful and extensive, covering more than 1,100 acres.

Industrially, Dayton ranks high among the cities of Ohio. Its manufactures include over 750 different products. Among the most important are cash registers—the largest in the world, electrical refrigerators, computing scales, fare registers, airplanes and accessories, automobile accessories, golf clubs, government stamped envelopes, paper cutting machinery, and publications.

The first settlement in Dayton, in 1796, was made on land purchased from the Indians by two army officers and Jonathan Dayton, after whom the place was named. It was incorporated in 1805, and chartered as a city in 1841. In March, 1913, the city suffered disastrously from a great overflow of the Miami River. Hundreds of lives were lost and millions of property value destroyed. For several days Dayton was entirely cut off from the rest of the world because tracks were washed out and wires were down. Many other towns in the Miami valley also suffered. Extensive flood-protection projects were at once undertaken and Dayton now has adequate insurance against repetition of the flood menace. Dayton is under the commission-city manager form of government, adopted in 1914. Population, 1930, 200,982.

DE, *day*, a French preposition meaning *of, from or away from*, used in connection with proper names to indicate noble origin or possession of territory, as *Duc de Montmorenci*, *Guy de Maupassant*, *Comte d'Artois*. When the word following the preposition begins with a vowel the *e* is dropped and *d* with an apostrophe is used, as in *d'Artois*. Several French expressions containing *de* or *d'* are heard frequently in English current speech, as *coup d'état* and *table d'hôte*.

DEACONESS, *de'kon ess*, a member of any one of various religious orders of women among Protestant churches. The order of deaconesses seems to have been established during the days of the Apostles, and the functions of the members were to assist the deacons and other officials of the church, especially in the care of women. In the fifth century the order was abolished and was not revived until the early part of the nineteenth century. The first of the modern orders was established in Prussia in 1836, by the United Evangelical Church.

The first order in the United States was established in Saint Andrew's Parish of the Protestant Episcopal Church, Baltimore, in 1855, and in 1888 the general conference of the Methodist Episcopal Church provided for the establishment of an order of deaconesses. The members of the modern orders are required to prepare themselves by special training in schools devoted to this purpose and are usually inducted into office by the authorities of the Church. Their work is similar to that of the early deaconesses, though somewhat more extended, as the requirements of the Church are broader. In the Roman Catholic and some of the Episcopal churches, the work corresponding to that of the deaconesses is performed by sisterhoods.

DEAD-LETTER OFFICE, a division of the Post Office Department to which is sent all mail matter that cannot be delivered. This matter includes all letters and packages that have remained in the office to which they were sent for one month without being called for, and which do not contain any address for their return to the sender; letters, papers and packages that are imperfectly addressed, and articles excluded from the mails by the regulations such as liquids, live animals and explosives.

Each year as many as 16 million letters and parcels reach the dead letter office.

DEAD RECK'ONING, the calculation of a ship's place at sea, without any observation of the heavenly bodies. It is obtained by keeping an account of the distance the ship has run by the log and of its course steered by the compass, and by rectifying these data by the usual allowance for drift, leeway and winds. Dead reckoning can never be accurate; so whenever possible it is corrected by astronomical observations.

DEAD SEA, called in Scripture **SALT SEA**, **SEA OF THE PLAINS**, and **EAST SEA**, a celebrated lake in southeastern Palestine on the border of Transjordan. Its length is about forty-seven miles, and its breadth at the widest part, nine miles. The basin in which the Dead Sea lies forms the south end of the great depression through which the Jordan flows, that river entering the lake at its north extremity. It receives several other tributaries, but has no outlet. The surface is 1,290 feet below the level of the Mediterranean. It lies deeply imbedded between lofty cliffs of naked limestone, its shores presenting a scene of indescribable desolation and solitude, encompassed by desert sands and bleak, stony, salt hills. Sulphur and rock salt, lava and pumice abound along its shores. Scientists declare, after exhaustive investigation, that this sea contains incredible riches. On the bottom of the sea, as precipitates, and held in solution in the water, are valuable chemicals which if all could be reclaimed would be worth easily twelve hundred million dollars. The water is nauseous to the taste and smell, and it is so buoyant that the human body will not sink in it. The Dead Sea contains no life. It is shallow in part, but has in one spot a depth of 1,308 feet.

DEADWOOD, S. D., the county seat of Lawrence County, near the western boundary of the state, on the Chicago, Burlington & Quincy and the Chicago & North Western railroads and on an electric line. The city is in the center of a rich gold belt, and cyanide works, smelters and other mining industries are located here. Among the important buildings are a Masonic Temple, a Carnegie Library, the Stilwell Curio Museum, the U. S. Assay Office and a Federal building. The place was settled in 1876. Population, 1930, 2,559.

DEAF, def, AND DUMB (or **DEAF-MUTES**), persons who cannot hear or speak. Some mutes are speechless because of de-

fects of the vocal organs, but there are many whose inability to articulate sounds arises from their never having heard those sounds. Human beings learn to speak through imitation of others whom they hear. There are two forms of deafness, *congenital* (existing from birth), and *acquired*.

Among the causes assigned for congenital deafness are the intermarriage of near relatives, hereditary transmission, scrofula, certain local or climatic conditions and arrest of development before birth. Acquired or accidental deafness, which occurs at all ages, is frequently due to such diseases as small-pox, measles, typhus, paralysis and other affections of the brain, but more particularly to scarlet fever, which may leave the patient deaf because the inflamed state of the throat extends to the internal ear, and thus causes the formation of pus and the destruction of the extremely delicate parts of the auditory apparatus.

The necessity of communication and the want of words oblige the deaf-mute to observe and imitate the actions and expressions which accompany various states of mind and of feeling, to indicate objects by their appearance and use, and persons by some peculiar mark, and to describe their actions by direct imitation. In this way he and his friends are led to form a dialect of that universal language of attitude, gesture and expression which becomes a substitute for words in the hands of the pantomimic actor, and which adds force and clearness to the finest effusions of the orator; in other words, the natural sign language, which, in its elements, is to be found among all nations. Such a means of communication is at its best very imperfect, however, and various more perfect systems have been devised to enable deaf-mutes to communicate with one another and with the rest of mankind, and thus to gain such an education as people in general possess.

Education of the Deaf and Dumb. In ancient times and during most of the Middle Ages, the deaf were considered incapable of caring for themselves and could not enter upon a contract. In 1648 John Bulwer published a work in English advocating the education of deaf-mutes. About one hundred years later the first public demonstration of the practicability of such education was made. At about the same time a successful system of instruction was introduced

into the Royal Parisian Institute, where it was followed for a long time. The vocal system of instruction was introduced into Germany in 1779, and the first public institute in England was established in 1792.



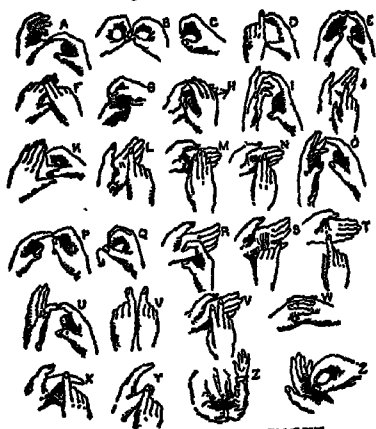
DEAF AND DUMB ALPHABET
For one hand

From this originated the London Asylum on Kent Road. The first school for the instruction of deaf in the United States was established at Hartford, Conn., in 1817. For a time this school received inmates from the New England states and from South Carolina and Georgia. Massachusetts then established an institute, and other states followed, until now every state has an institution for the education of deaf-mutes, and several states have provisions for establishing classes in connection with the public schools. In the entire country there are over 150 state, private and public day schools for the deaf; Canadian cities maintaining such institutions include Montreal, Quebec, Toronto, Winnipeg and Victoria.

There are two methods of instruction which are generally followed. These are known as the *sign* method and the *oral* method. According to the first, the pupils are taught by the manual alphabet and by signs. According to the oral method the pupils are taught to observe the lips and other vocal organs of the teacher and then to reproduce the sounds. In the teaching of deaf chil-

dren to speak, the pupils not only are expected to observe the *motions* of the organs, but are required to place their hands upon the throat of the teacher and feel the vibrations, then to place their hands upon their own throats and reproduce these vibrations. In some schools the Bell system of visible speech (which see) has replaced the method just described. The Bell system consists of a series of alphabetical characters based on the position of the vocal organs when they are moving. In the most up-to-date schools pupils learn lip reading in connection with the study of vocal sounds. By observing the motion of the lips they learn to recognize words and can thus carry on conversations with comparative ease.

Opinion has been divided on the advantages to be derived from each of these methods of instruction. Those who favor the sign method claim that it is much more easily learned, and that the pupils therefore can make more rapid progress; while the opponents of this system claim that the use of the



DEAF AND DUMB ALPHABET
For two hands

sign language is not calculated to develop the intellect, and that pupils trained by this method never receive as broad an education or become as efficient thinkers as those trained by the oral method. The general trend of opinion is decidedly in favor of the oral method, and in the greater number of American schools the sign method is not used. See KELLER, HELEN A.; SIGN LANGUAGE.

There is a growing body of literature on the subject of the education of the deaf, much

of which is especially helpful to parents of afflicted children. Mention should be made particularly of John D. Wright's *What the Mother of a Deaf Child Ought to Know*, and recent volumes of the *Volta Review*, published by the Volta Bureau at Washington, D. C.

DEARBORN, HENRY (1751-1829), an American soldier who distinguished himself in many battles of the Revolution and in the War of 1812. He was captured by the British at Quebec, but was released and was with Washington at Yorktown. In 1793 he was elected to Congress, and for eight years he was Secretary of War. His last public service was as minister to Portugal. Fort Dearborn, on the site of Chicago, was named for him.

DEATH, the final condition of all animal and vegetable matter, characterized by the stoppage of all growth and motion. Human beings die when the heart stops beating, for this means arrest of the circulation and of the supply of nourishment to the tissues. Throughout life some of the body cells are always dying, and new ones are taking their places. The living body is therefore undergoing a continuous battle with death; we begin to die as soon as we begin to live. The subject of increasing the span of man's life by control of disease is one of the vital questions of the present day. In general, the death rate among civilized nations is gradually being lowered as knowledge of hygiene and sanitary science is increasing.

DEATH'S HEAD MOTH, a large moth, measuring five inches when the wings are extended. It has upon the back of its thorax marks closely resembling a skull, or death's head. Although the subject of many superstitious beliefs, it is probable that it



DEATH'S HEAD MOTH

does no other damage than occasionally attacking bees and consuming their honey.

DEATH VALLEY, a desolate, arid plain bordered by mountains, situated near the

eastern boundary of California, in Inyo County. During the rush to the gold fields in 1849, a band of emigrants lost most of their company in this barren region, and the name which they gave the valley has been retained. Death Valley is about 150 miles long and varies in width from ten to thirty miles. Its lowest point is 276 feet below sea level. Notwithstanding the general aridity of the region, several kinds of animals and many varieties of plants exist there.

In order to preserve the national wild life of the region, Death Valley was, given, by presidential proclamation in 1933, the status of a national monument. Permits to prospectors are issued only by authority of the Secretary of the Interior.

DEBATE, *debatt'*, a formal discussion carried on by two opponents or two teams of opponents, in which each side endeavors to prove the truth of certain statements and to refute the arguments presented by the other side. The subject under discussion is generally stated in the form of a resolution, as, "Resolved, That city life is of greater benefit to the individual than country life." The side upholding this resolution is called the *affirmative*; the side presenting arguments against it is the *negative*. Sometimes the subject is framed as a question, as, "Should labor unions be encouraged?" In this case the affirmative side argues on the side of the labor unions, and the negative argues against them.

The first speaker for the affirmative always begins the debate; he is followed by the first speaker for the negative. The second speaker for the affirmative continues, and so on, alternately, until all have spoken once. Finally, the leader for the negative summarizes the arguments for his side, and the debate closes with a summary by the affirmative leader. Usually the decision as to the winner of the debate is left to three judges. They award the decision to the side which has presented the most points and has best answered the points made by the opposing side.

The ideal subject is one which permits a well-balanced argument. The points for and against should be as nearly equally divided as possible, or else one side will have an undue advantage. The resolution should be stated as clearly and as concretely as possible. Ambiguous phrasing leads to con-

fusion of interpretation and prevents a really fair presentation. The subject should not be too general, and it should have enough points of interest to stimulate research and thought. A discussion as to the comparative merits of Grant and Lee is a good selection, because both generals were commanders in chief in the Civil War, and each was the best officer on his side. A debate on the merits of Napoleon and McClellan, on the other hand, is an example of a one-sided discussion. Again, if the subject of woman's rights be debated, the resolution should state clearly what rights are meant, whether voting, the right to hold office, equality in business life, or other right. Debating is an excellent drill for young people. It trains the mind to think logically, it develops ability to express oneself orally, and it trains the judgment. If worth while subjects are chosen it adds to the debater's store of information and gives him valuable training in research work.

Suggested Topics. Below is given a list of subjects appropriate for discussion by a school or neighborhood debating club:

Resolved,

That the censorship of moving pictures should be abolished

That the United States should institute universal military service as a permanent feature.

That the settlement of labor disputes by arbitration should be made compulsory

That the city manager system is preferable to any other form of city control.

That there should be a small property qualification for voters rather than universal suffrage.

That all nations should reduce their navies to one-third their present size.

That credits in Latin should not be required for college entrance

That local option is more effective than state prohibition in dealing with liquor

That the honor system of examinations should be established in our high school

That high school fraternities are undesirable.

That children under fourteen should not be permitted to work for wages.

That the Monroe Doctrine as a feature of the foreign policy of the United States should be abandoned.

That the law forbidding illiterate immigrants to enter the United States should be repealed.

That the Presidential term should be increased to six years and the President be ineligible to succeed himself

That national governments should own and operate all telegraph, telephone and railroad systems.

Outline of a Debate. A subject appropriate for a school debate follows, with arguments for both sides outlined:

Resolved, that capital punishment should be abolished in the United States.

Affirmative

1. Capital punishment is unnecessary, for justice can be meted out to the offenders by means of imprisonment. Society is at the same time protected from their lawlessness.

2. Life imprisonment is a more severe punishment than death, because it makes the offender pay the penalty through a long period of time.

3. Capital punishment has evil effects upon the community, for—

A. It diminishes the sacredness in which human life is held; if the state claims the right to kill its citizens, individuals will feel that they are justified in taking life. Only God has the right to take human life.

B. Capital punishment tends to lower the moral sense of the public, for the details are usually published in all their horror.

C. It often leads to outbursts of sentimentality on the part of the public. Juries will sometimes acquit guilty prisoners rather than give decisions that mean death. Thus the murderer may be freed.

4. Capital punishment is not in accordance with the most enlightened methods of saving the criminal. It should be replaced by reformatory methods.

5. Capital punishment is a relic of a past age when cruelty and revenge were in vogue. This is a humane age, and the best thought of the time is opposed to the death penalty.

Negative

1. Capital punishment is the only sure punishment for grave crimes. An imprisoned murderer always has the hope of being pardoned. There is no sure protection from criminals so long as they are alive.

2. There is no greater punishment to the average person than taking away his right to life.

A. Capital punishment is merely a recognition of the right of the state to protect society from the evil passions of those who defy the law of God and man. A man who takes life is morally bound to pay for his crime with his own life.

B. The fact that newspapers publish nauseating details does not alter the justice of the execution. The papers should be prohibited from featuring such events as executions.

C. Trials for murder should be conducted without publicity. Sentimental outbursts are due to newspaper exploitation.

3. The first duty of the state in dealing with criminals is the protection of society. The fear of death acts as a deterrent on the passions of those who might commit murder, and where capital punishment is in force crimes are decreasing.

DEBORAH, *deb' o rah*, a prophetess of the Israelites, called a "mother in Israel," who lived during the time of the Judges. Her story is related in the book of *Judges*, the fifth chapter of which is a spirited poem called the *Song of Deborah*. It celebrates the victory which the Israelites, led by Deborah and Barak, won over the army of the Canaanites. Deborah was the wife of Lapidoth, and the family dwelt in the hill country of Ephraim, according to the account in *Judges IV*. There is no evidence that the *Song of Deborah* was written by her, though certainly she inspired it.

DEBS, **EUGENE VICTOR** (1855-1926), an American Socialist of very radical theories. He was the Socialist party candidate for President of the United States in 1900, 1904, 1908, 1912 and 1920, in the latter year he was a Federal prisoner in Atlanta. Debs was born at Terre Haute, Ind. He received a common school education, became locomotive fireman on the Terre Haute & Indianapolis Railroad, and finally was a clerk in a wholesale grocery house. In 1879 he was elected city clerk of Terre Haute and six years later became a member of the Indiana legislature. From 1880 to 1893 he was grand secretary and treasurer of the Brotherhood of Locomotive Firemen, and in the latter year he was made president of the newly organized American Railway Union. In that capacity he had charge of the great western railway strike that centered at Chicago in 1894. During its progress he was charged with conspiracy, but was acquitted; however, he was imprisoned for six months for contempt of court in violating an injunction. From that time on he was an active Socialist leader.

Debs, with many other American Socialists, opposed America's participation in the World War, and in a speech made at Canton, Ohio, in June, 1918, he uttered statements forbidden by the espionage law. For making these statements he was tried, found guilty and sentenced to ten years' imprisonment. In March, 1919, the United States Supreme Court upheld the sentence of the lower court. His radical views did not un-



EUGENE V. DEBS

dergo a change thereafter, for before he was taken to prison he reaffirmed his bolshevist principles and declared Lenin and Trotsky of Russia to be the greatest living men. From his prison cell in Atlanta he conducted his campaign to a slight extent, but his influence was confined to the radical element, who made a strong plea for the release and pardon of the candidate. In December, 1921, he received a commutation of sentence from President Harding, and was released.

DEBT, *det*, in the most general sense, that which is due from one person to another, but more strictly, in law, a sum of money due by reason of a particular and explicit agreement.

People are usually urged to avoid contracting debts under the conviction that indebtedness is a mortgage upon a person's future and therefore exceedingly dangerous. To contract debts for unnecessary purchases is properly frowned upon by economists, but there is a class of debts which are declared to be wholesome. To borrow money for business or home development, where the investment is permanent and there are very reasonable prospects of payment, has long been sanctioned. A proper debt serves as an incentive to honest endeavor.

An action to recover the amount of a debt is begun by civil suit, which may result in a judgment payable in money, or, in lieu of voluntary payment, by forcible seizure of enough of the debtor's property to pay the debt and the costs of the suit. Courts, however, still possess the right to punish severely and even to imprison debtors, where fraud or concealment of deception is evident.

Related Articles. Consult the following titles for additional information:
 Bankruptcy Embezzlement
 Contract Garnishment

DEBT, NATIONAL See **NATIONAL DEBT**

DEBUSSY, *de bus se*, **CLAUDE ACHILLE** (1862-1918), a French composer, leader of the modern school of music in France. He is the exponent of the highest refinement in composition, and has had wide influence not only in France but in Spain, England and America. Debussy was educated at the Paris Conservatory, where he won several prizes, including the Grand Prix de Rome. After producing a number of miscellaneous works for piano and orchestra, he created a sensation in 1902 with a music drama, *Pelleas and Melisande*, a work that gave him an undisputed place at the head of the new French

school. Since then he has made numerous other contributions to the world's body of written music, notably the ballets *Joux* and *Crimen Amoris*, four music dramas and several songs.

DECALOGUE, *dek'a log*, the Ten Commandments, which, according to *Exodus XX* and *Deuteronomy V*, were given by God to Moses on two tables of stone. The Jews called them the *ten words*, and the term *decalogue* is made up of the Greek words for *ten* and *word*. Christians have divided the Ten Commandments differently; and in some Roman Catholic catechisms the second Commandment has been united with the first, and the tenth has been divided into two.

DECATUR, *ILU*, the county seat of Macon County, thirty-eight miles east of Springfield, on the Sangamon River and on the Illinois Central, the Wabash, the Pennsylvania, and the Baltimore & Ohio railroads. There is an airport. The city is in a fertile agricultural section, and ships large quantities of grain, live stock and coal. There are large grain elevators, flour mills, railroad shops and manufactories of iron, agricultural implements, soda fountains and cereals. The city has James Millikin University and Conservatory of Music. The commission form of government has been in force for a number of years. Population, 1920, 43,818; in 1930, 57,510, a gain of 31 per cent.

DECATUR, **STEPHEN** (1779-1820), one of the early heroes of the American navy, was born in Sinnepuxent, Md. In 1798 he entered the navy, and in 1803 he was given command of the *Enterprise*. The recapture and destruction of the United States frigate *Philadelphia*, which had been taken by the Tripolitans, was a daring act which won him promotion to the rank of captain. In 1812, while commander of the frigate *United States*, he encountered the British frigate *Macedonian* and captured her. On his way to sea through Long Island Sound, in 1813, Decatur's vessel was blockaded by the British fleet, and he was driven into New London where he was kept for a year by a blockade. In 1815 he was sent with a squadron of nine vessels to the Mediter-



STEPHEN
DECATUR

anean, captured two Algerine vessels and compelled the dey of Algiers to negotiate a treaty. He then entered Tunis and Tripoli, forced the release of the American prisoners and obtained satisfaction for past offenses. His death was caused by a wound received in a duel with Commodore Barron.

DECCAN, *dek an'*, a term once applied to the entire peninsula of India, but which more precisely refers to the state of Hyderabad and those territories which once formed a part of that Moslem state but which were ceded to the British in 1859.

DECEMBER, *de sem'ber*, the twelfth month of the year. The name comes from the Latin *decem*, meaning *ten*, because in the Roman year, instituted by Romulus, it constituted the tenth month, the year beginning with March. In December the sun enters the tropic of Capricorn and passes the winter solstice. This month has thirty-one days. The birthstone for December is the turquoise, and its special flower is the holly.

Special Days for Observance. *Christmas* is the most important festival of the month of December. See **CHRISTMAS**.

New Year's Eve, the last day of the month, is a time of special festivities.

Forefathers' Day, December 21, is celebrated in some parts of New England in remembrance of the landing of the Pilgrim Fathers.

Anniversaries for Celebration. The following birthdays of notable persons fall in December:

Thomas Carlyle, December 4, 1795
Martin Van Buren, December 5, 1782
George A. Custer, December 5, 1839
Mary Queen of Scots, December 7, 1542
Eli Whitney, December 8, 1765
Joel Chandler Harris, December 8, 1843
John Milton, December 9, 1608
William Lloyd Garrison, December 10, 1805
Edward Eggleston, December 10, 1837
Phillips Brooks, December 13, 1825
Jane Austen, December 16, 1775
Sir Humphry Davy, December 17, 1778
John Greenleaf Whittier, December 17, 1807.
Lyman Abbott, December 18, 1825
Edward A. MacDowell, December 18, 1861
Cyrus Townsend Brady, December 20, 1861
Clara Barton, December 25, 1821
Sir Isaac Newton, December 25, 1642.
Woodrow Wilson, December 28, 1856
William B. Gladstone, December 29, 1809

The following important events occurred in December:

Reading in Congress of President's message containing the Monroe Doctrine, December 2, 1823

Illinois admitted to the Union, December 3, 1818
 Rome made capital of United Italy, December 5, 1870
 Columbus discovered Hayti, December 6, 1492
 Death of Jefferson Davis, December 6, 1888
 Bucharest, capital of Rumania, captured by Germans, December 6, 1916
 Formation of the Australian Confederation, December 9, 1885
 Mississippi admitted to the Union, December 10, 1817
 Indiana admitted to the Union, December 11, 1816
 Delhi made capital of India, December 12, 1911
 Alabama admitted to the Union, December 14, 1819
 President Wilson arrived in Paris, December 14, 1918
 Boston "Tea Party," December 16, 1773
 Landing of the Pilgrims, December 21, 1620
 Organization of the Methodist Episcopal Church in America, December 24, 1784
 Washington crossed the Delaware, December 25, 1776
 Iowa admitted to the Union, December 28, 1846
 Texas admitted to the Union, December 29, 1845
 First American Y M C A. established in Boston, December 29, 1851

DECEMVIRS, *de sem'virs*, (Latin, *decem*, ten, and *vir*, man), a board of ten men; specifically, the body of ten magistrates who had absolute authority in ancient Rome, 451-449 B C. Those who officiated during the first of these years drew up an excellent code of laws and ruled wisely, but those who followed them were tyrannical and were driven from power.

DECIDUOUS, *de sid'u us*, **TREES**. The word *deciduous* is from the Latin, and means *to fall down*. A deciduous tree is one whose leaves fall off at a fairly regular time every autumn and are as regularly renewed in the spring. Nearly all forest trees are of this variety. While in most countries the loss of leaves is in the autumn, in some parts of the world the change from foliage to bareness is governed by arrival of the dry season. Those trees which are not deciduous are evergreen (which see)

DECIMAL FRACTIONS, *des's mal frak'shunz*. See **ARITHMETIC**

DECLARATION, in law, the first pleading in an action, submitted in writing and accompanied by affidavit. All the facts alleged must be set forth, for they constitute the plaintiff's whole cause for action. If such is not the case, the defendant by demurrer may have the case dismissed.



DECLARATION OF INDEPENDENCE, the solemn declaration of the Continental Congress in America, in session at Philadelphia, by which the thirteen colonies formally renounced allegiance to the government of Great Britain. It was the outgrowth of a gradual change of sentiment among the colonists, away from the old affection for England and its

traditions toward a pride in local achievements and the love of the principles of self-government. The formal declaration was preceded by resolutions in the assemblies of almost all of the colonies, declaring that independence was inevitable and necessary. Finally, on May 15, 1776, John Adams offered a resolution recommending that each state form its own independent government, and on June 7 another formal resolution was introduced by Richard Henry Lee, declaring—

That these United Colonies are and of right ought to be, free and independent States, that they are absolved from all allegiance to the British Crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved,

That it is expedient forthwith to take the most effectual measures for forming foreign alliances,

That a plan of confederation be prepared and transmitted to the respective colonies for their consideration and approbation

After a long and somewhat bitter debate, in which the representatives of New York and Pennsylvania opposed the resolution, causing a delay of some weeks, it was passed on July 1, New York alone still withholding its approval. A committee to draft a declaration had been appointed on June 10, consisting of Thomas Jefferson of Virginia, John Adams of Massachusetts, Benjamin Franklin of Pennsylvania, Roger Sherman of Connecticut and Robert R. Livingston of New York. As it was presented the Declaration was the work chiefly of Thomas Jefferson, and was adopted with few changes, on July 4, by twelve colonies, New York adding its approval on July 9. The document was endorsed and signed on August 2, 1776. The news of the adoption on July 4 caused the wildest rejoicing in all parts of the country.

and did much to produce unity of sentiment throughout the colonies. The original document is now in the State Department, and is sealed in a steel case for preservation among the priceless relics of the nation.

The Text. The Declaration of Independence, as adopted, is in full as follows:

THE UNANIMOUS DECLARATION OF THE THIRTEEN
UNITED STATES OF AMERICA

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the Powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation

We hold these truths to be self-evident: that all men are created equal, that they are endowed by their Creator with certain inalienable rights, that among these are life, liberty, and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established should not be changed for light and transient causes, and accordingly all experience hath shown that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security—Such has been the patient sufferance of these colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain is a history of repeated injuries and usurpations, all having in direct object the establishment of an absolute tyranny over these States. To prove this, let facts be submitted to a candid world

He has refused his assent to laws the most wholesome and necessary for the public good

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained, and when so suspended, he has utterly neglected to attend to them

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature, a right

inestimable to them and formidable to tyrants only

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures

He has dissolved representative houses repeatedly, for opposing, with manly firmness, his invasions on the rights of the people

He has refused, for a long time after such dissolutions, to cause others to be elected, whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise, the State remaining, in the meantime, exposed to all the dangers of invasion from without, and convulsions within

He has endeavored to prevent the population of these States, for that purpose obstructing the laws for naturalization of foreigners, refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers

He has made judges dependent on his will alone for the tenure of their offices, and the amount and payment of their salaries

He has elected a multitude of new offices, and sent hither swarms of officers to harass our people and eat out their substance

He has kept among us, in times of peace, standing armies without the consent of our legislatures

He has affected to render the military independent of and superior to the civil power

He has combined with others to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws, giving his assent to their acts of pretended legislation

For quartering large bodies of armed troops among us

For protecting them, by a mock trial, from punishment for any murders which they should commit on the inhabitants of these States

For cutting off our trade with all parts of the world

For imposing taxes without our consent

For depriving us, in many cases, of the benefits of trial by jury

For transporting us beyond seas to be tried for pretended offenses

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render at once an example and fit instrument for introducing the same absolute rule into these colonies

For taking away our charters, abolishing our most valuable laws, and altering fundamentally the forms of our government

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever

He has abdicated government here, by declaring us out of his protection, and waging war against us

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people

He is, at this time, transporting large armies of foreign mercenaries to complete the works of death, desolation and tyranny, already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation

He has constrained our fellow-citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands

He has excited domestic insurrections amongst us, and has endeavored to bring on the inhabitants of our frontiers, the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions

In every stage of these oppressions we have petitioned for redress in the most humble terms: our repeated petitions have been answered only by repeated injuries. A prince, whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them by the ties of our common kindred to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They too have been deaf to the voice of justice and of consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and holds them, as we hold the rest of mankind, enemies in war, in peace friends.

We, therefore, the Representatives of the United States of America, in general Congress assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the name, and by authority of the good people of these colonies, solemnly publish and declare, That these United Colonies are, and of right ought to be, free and Independent States, that they are absolved from all allegiance to the British crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved; and that, as free and independent States, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent States may of right do. And for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes, and our sacred honor

(Signed) John Hancock

New Hampshire—Josiah Bartlett, Wm Whipple, Mathew Thornton

Massachusetts Bay—Saml. Adams, John Adams, Robt. Treat Paine, Elbridge Gerry.
Rhode Island—Step. Hopkins, William Ellery.

Connecticut—Roger Sherman, Sam'l Huntington, Wm. Williams, Oliver Wolcott.

New York—Wm Floyd, Phil. Livingston, Frans Lewis, Lewis Morris

New Jersey—Richd Stockton, Jno. Witherspoon, Fras Hopkinson, John Hart, Abra. Clark

Pennsylvania—Robt. Morris, Benjamin Rush, Benja Franklin, John Morton, Geo. Clymer, Jas Smith, Geo Taylor, James Wilson, Geo Ross

Delaware—Cesar Rodney, Geo. Read, Tho. M'Kean

Maryland—Samuel Chase, Wm. Paca, Thos. Stone, Charles Carroll of Carrollton.

Virginia—George Wythe, Richard Henry Lee, Th Jefferson, Benja Harrison, Thos. Nelson, Jr, Francis Lightfoot Lee, Carter Braxton

North Carolina—Wm. Hooper, Joseph Hewes, John Penn

South Carolina—Edward Rutledge, Thos. Heyward, Junr, Thomas Lynch, Junr, Arthur Middleton

Georgia—Button Gwinnett, Lyman Hall, Geo Walton

DECLARATION OF WAR. See WAR, DECLARATION OF.

DECLINATION, in astronomy, the distance of a heavenly body from the celestial equator, measured on a great circle passing through the pole and also through the body. It is said to be north or south according as the body is north or south of the equator. Great circles passing through the poles and cutting the equator at right angles are called *circles of declination*. Twenty-four circles of declination, dividing the equator into twenty-four arcs of 15° each, are called *hour circles*. Declination, then, corresponds to latitude on the earth and is one of the two elements in determining the location of heavenly bodies. In other words, if the right ascension and the declination of a star are known, astronomers can locate it at once (see **ASCENSION, RIGHT**). Declination of the magnetic needle in the compass, or *magnetic declination*, is the variation of the magnetic needle from the true meridian of a place

DECOMPOSITION, *de kom po sish'un*, is the breaking up of a compound into more simple parts. These parts may be either compounds or elements. In most cases decomposition separates one body into two or more bodies, but what is called double decomposition is a change or breaking up of two or more compounds into the same number of

other compounds. Decomposition may be caused by such forces as heat, light, electricity and chemical reagents; or it may be due, as in the case of vegetable and animal matter, to very small animals or plants, called bacteria and ferments.

DECORATION DAY, a popular term applied to Memorial Day (which see).

DECOY, *de koi'*. In the United States and Canada a decoy is an artificial bird, made of wood and painted faithfully to represent a living bird. It is placed on the water, where it floats about in a lifelike manner, and thus attracts live birds of the same kind to the spot, where they may be shot by concealed hunters. Duck decoys are the most common. In every-day speech, anything which is a lure or a snare is called a decoy.

DEDUCTION, *de duk'shun*, in logic, is the process of reasoning from a general statement to a particular fact, from an abstract theory to a concrete case, from the universal to the individual. An excellent example of the deductive method is afforded by the reasoning followed by Leverrier in his discovery of the planet Neptune. In the latter part of the seventeenth century Sir Isaac Newton worked out the theory of universal gravitation; namely, that every particle of matter in the universe exerts an attractive force on every other particle.

Working from this theory (to cite an example), the French astronomer Leverrier figured that there must be an undiscovered planet in the heavens which was causing irregularities in the motions of the known planets. That is, he used the general theory that gravitation is everywhere in operation, and he worked to the concrete fact that there was a planet in a particular region in the heavens, because only the attractive force of such a planet could account for certain disturbances in the motions of the planets. Shortly after he published his deductions Neptune was discovered in the place indicated by him.

The opposite method of reasoning, called *induction*, is explained under that heading.

DEDUCTIVE METHOD, in pedagogics, the method of teaching which begins with general truths, such as definitions and rules, and proceeds to apply them to particular facts. It is also called the *synthetic method*, because it creates individual ideas under general laws. It is the reverse of the inductive method and is adapted to much of

the work in grammar grades and predominates in teaching in high schools, colleges and universities. Geometry affords an excellent illustration of a branch which is taught by the deductive method. The theorems are the general truths with which the pupil starts, and he proceeds to prove these by the demonstration of particular propositions. See *INDUCTION*; *METHODS OF TEACHING*.

DEE, the name of two rivers in Scotland. The larger rises in the neighborhood of Ben Macdhui, and after a course of twelve miles it is joined by the Geanley, runs through Aberdeenshire and a part of Kincardineshire and empties into the North Sea. It is ninety miles long. The smaller Dee rises near the northern boundary of Kirkcubrightshire. It flows in a southeasterly direction during the first part of its course, and then westerly, falling into the Solway Firth. It is fifty miles long and is noted for its excellent fisheries.

DEED, a written agreement, sealed and delivered, whereby a transfer of title is effected. In popular use the word is applied only to transfers of land, but in law it is applied to many other transactions. In fact whether or not a certain document is a deed or not depends on its form, not on the property involved. Transfers of personal property, title to office, and contracts of almost any kind may be in the form of deeds.

A deed, under the common law, was not valid unless it was sealed and actually delivered to the person named to receive title, who is legally known as the "party to be benefited." Most of the states still require a seal, though in a few it has been abolished; in most of them, moreover, the word *Seal* written within a ring or a scroll, may be substituted for the actual wax seal. The important point is not that the seal must be there, but that it must be there as the act of the person or persons to be bound by it. It must be his "own act and seal."

A deed being a form of contract, it must be executed by persons legally capable of binding themselves, should name a consideration, and should fulfil the other requirements of a contract (see *CONTRACT*). Frequently the parties to a deed prefer not to let other people know how much money was involved. In such a case, the deed may mention a "nominal consideration," as one dollar. The deed is exactly as binding as if it

stated the exact number of dollars for which the property was actually sold. A deed must always be on paper or parchment; it may be written, typewritten or printed. It must contain the names of the grantor and the grantee, and it should, for safety, be signed by both parties in the presence of witnesses, even if the laws of the particular state do not require signatures, as shown in the following form of warranty deed:

THE GRANTOR, Arthur Jones, of the city of Topeka, in the county of Shawnee and state of Kansas, for and in consideration of the sum of seven thousand five hundred dollars, in hand paid, give, grant, sell and convey to Frank Rawson Walsh, also of the city of Topeka, county of Shawnee and state of Kansas, the following described Real Estate, to-wit:

situated in the city of Topeka, in the county of Shawnee, in the state of Kansas
And I, the said Arthur Jones, the grantor, for my heirs, executors and administrators, do covenant with the said Frank Rawson Walsh, the grantee, his heirs and assigns, that I am lawfully seized in fee of the afore-granted premises, that they are free from all incumbrances, that I have good right to sell and convey the same to the said Frank Rawson Walsh as aforesaid and that I will, and my heirs, executors and administrators shall, warrant and defend the same to the said Frank Rawson Walsh, his heirs and assigns forever, against the lawful claims and demands of all persons

Dated, this nineteenth day of October, A D 1945

Witnessed by
Malcolm Cameron (Seal)
Arthur Jones (Seal)
Maurice Lawrence (Seal)
Frank Rawson Walsh (Seal)

In the case of individuals, a deed signed by a married man should also be signed by his wife; in the case of corporations the charters or by-laws usually name the officers who may execute deeds and other contracts.

Warranty and Quit Claim. In some deeds, as in the form above, there is a clause known as the *warranty*. A *quit-claim* deed is one in which the grantor makes no guarantee, but simply conveys whatever title he has. A short form of quit-claim deed is given below:

KNOW ALL MEN BY THESE PRESENTS, that I, Alfred Mason, of the city of Omaha, in the County of Douglas, and State of Nebraska, in consideration of six thousand dollars, in hand paid, do hereby grant, sell, remise, release and forever quit claim unto Chauncey Wilson, of the city of Omaha, in the County of Douglas and State of Nebraska, the following described real estate, situate in the County of Douglas and State of Nebraska (describe properly the land or premises granted)

TO HAVE AND TO HOLD the above described premises, with the appurtenances, unto the said Chauncey Wilson and to his heirs and assigns forever

Signed this tenth day of January, A D 1945

In the presence of Alfred Mason (Seal)
Francis K Polk Chauncey Wilson (Seal)

Where the grantor's title is perfect, a quit-claim deed is as effectual a transfer as

a warranty deed, except that the grantee must—the courts say, “at his peril”—ascertain whether there are any claims against his title. In other words, by a warranty deed the seller assumes the responsibility for the title; by a quit-claim deed the responsibility rests on the buyer.

Registration. A deed, whether or not the statute requires it should be registered in the county recorder's office. The system of registration has greatly simplified the laws on the subject of deeds, and has made useless much of the early court decision on the subject. Nearly all the states and provinces of Canada have special legislation on the subject of deeds. Grantor and grantee should always be careful that they are following the law of the state or province in which the deed is executed.

Finality of Deeds. From early times deeds have been used for the transfer of land, but their practically exclusive use for this purpose is modern. A deed is, in fact, almost the sole remaining mode of conveying ownership or other interests in land. It is common knowledge that a deed is the most solemn and binding contract respecting property into which a man may enter. This overwhelming finality which has always attached to a deed is probably the result of a fact that deeds were first used in an age when writing was a great accomplishment, common only among the monks and priests. Its solemn character must have become established before the art of writing became more general.

DEER, a general name for certain hoofed animals constituting a family in which there are more than fifty species. Some of them are among the most beautiful specimens of animal life

The distinguishing characteristic of the genus is that the members have solid, branching horns, which they shed every year. These antlers are outgrowths from the bone and are first covered by flesh and a velvety skin, which, when the horns are fully developed, dries up and is rubbed away, leaving the bones bare. The forms of the horns are various; sometimes they spread into broad palms, which send out sharp snags around their outer edges; sometimes they divide fantastically into branches, some of which project over the forehead, while others are reared upward in the air; or they may be so inclined backward that the animal seems

almost forced to carry its head in a stiff, erect posture. After the breeding season the antlers fall off, leaving only a little prominence on the head, from which the new antlers develop with great rapidity. The male deer is called a *buck*; the female, a *doe*; the young, a *fawn*.

There are many species of deer, as the *red deer* or *stag*, the *fallow deer*, the *roe buck*, the *reindeer*, the *moose*, the *elk*, and the *wapiti*. (See article **GAME**, for illustrations.) Deer are fairly widely distributed over the world, though there are none in Australia and few in Africa, where the antelopes take their place. Hunting the deer is great sport in Northern woods, and the flesh, or *venison*, as it is called, is much desired for the table. However, as deer become scarcer year by year, laws have been passed to protect them, and the hunting season in many states and provinces is restricted to two or four weeks each year. The skin is valuable for making a leather, called *buckskin*, and the antlers and hoofs are used in the manufacture of various kinds of ornamental goods.

Related Articles. Consult the following titles for additional information:
 Caribou Moose
 Elk Reindeer

DE FACTO, *de fak'toh*, a Latin term meaning *actually existing*. A *de facto* government is one which exists and performs the functions of government, regardless of its legal right to existence or whether it represents the majority of the people. Such a government was that of Lenin and Trotsky in Russia, Hitler in Germany, and Mussolini in Italy. See **DE JURE**

DEFOE, DANIEL (1661-1731), one of the first English novelists, born in London. He was educated for the ministry, but began early to give his attention to literature. His first publications were political satires, notable among them *The True-born Englishman*, a pamphlet in favor of William III, and *The Shortest Way with Dissenters*. The *Apparition of Mrs. Veal*, published in 1708, showed much of the genius for making fiction seem like fact which so strongly marks Defoe's later work.



DANIEL DEFOE

In 1719 appeared *Robinson Crusoe*, reckoned usually as the first English novel, in the modern sense of the term. This was followed by *The Memoirs of a Cavalier*, *Captain Singleton*, *Moll Flanders*, *Journal of the Plague Year* and *Roxana*, which, while they never attained the popularity of his first work, nevertheless possessed many of the qualities which made that remarkable. Defoe's genius consisted in his ability to put himself in the place of his characters and to give without wearisomeness the details which make a story seem real.

DEGENERATION, *de jen er a'shun*, a term applied in biology to certain changes undergone by plant and animal life, whereby there is a falling off in size, productivity, vigor or other qualities. The causes of degeneration include lack of nourishment, disuse, and change of habit. The effect of long-continued disuse of a part or organ is shown in the uselessness of the small toe on the foot of man. Primitive man had flexible toes like those of the monkey, but as civilization caused changes of habit the toes, particularly the small one, degenerated, and the latter seems to be heading toward extinction. The vermiform appendix is an example of an organ which has lost whatever function it may originally have had. Not only do organisms degenerate, but whole classes, and this is true of the human race and of the lower animals.

The aborigines of Australia are a degenerate race; in the animal world one might cite parasites, sponges and barnacles as examples of degeneration. In the vegetable world we find that plants which are forced to grow for a succession of years in poor soil or an unfavorable climate tend to become inferior. Mental and moral degeneration among civilized peoples is one of the vital questions with which eugenics, sociology and religion have to deal.

DEGLUTITION, *deg lu tish'un*. See **SWALLOWING**.

DEGREE, a term denoting extent or intensity. In mathematics it is the ninetieth part of a right angle, or one of the 360 equal parts into which the circumference of a circle is supposed to be divided. A *degree of latitude* is the 360th part of the earth's circumference north or south of the equator, measured on a great circle at right angles to the equator, and a *degree of longitude* is the same part of the surface east or west of any

given meridian, measured on a circle parallel to the equator.

Degrees are marked by a small ° near the top of the last figure of the number which expresses them; thus, 45° is 45 degrees. The degree is subdivided into sixty equal parts, called minutes; and the minute is again subdivided into sixty equal parts, called seconds; thus, 45° 12' 20" means 45 degrees, 12 minutes and 20 seconds. Under the equator a degree of longitude contains 60 geographical or 69.16 statute miles (see *MILE*). The degrees of latitude are found to increase in length from the equator to the poles, owing to the shape of the earth. At the equator, 1° of latitude equals about 68.7 miles; at 45°, 1° equals about 69.05 miles.

The term *degree* is also applied to the divisions, spaces or intervals marked on a mathematical, meteorological or other instrument, as a thermometer or barometer.

In Education. The name *degree* is also given to the title bestowed upon one who has successfully completed a prescribed course of study or training. There is no strict uniformity in requirements for a degree in America, so the value of a degree varies. In some schools a knowledge of Greek is required for the degree *bachelor of arts*; in others no such requirement exists. A course of study including languages and philosophy as major divisions leads to the degree named above; if sciences and mathematics or engineering are prominent, the degree given is that of *bachelor of science*. A course in law confers the degree *bachelor of law*. Post-graduate courses lead to the *master's* and *doctor's* degrees.

Men and women of outstanding attainments are frequently granted degrees known as *honorary*. Among these are doctor of philosophy (Ph D)—sometimes worked for, therefore not honorary, doctor of laws (LL D); doctor of civil law (D C L), doctor of literature (Litt D), and doctor of sacred theology (S T D).

DEISTS, a name applied to those theologians and their followers in the seventeenth and eighteenth centuries who believed that the nature of existence of the Deity could be proved from the manifestations of Nature. They disregarded the evidences of revealed religion, as almost universally taught.

DE JURE, *de joo're*. The term is from the Latin and means *by right*, or *by lawful title*. A *de jure* government is one which exists by

legal right, organized in conformity to law, authorized by the people or accepted by them as the regularly constituted authority. See *DE FACTO*.

DEKALB, JOHANN, Baron (1721-1780), a German soldier who volunteered his services to the new American nation in the Revolutionary War. He was born in Bavaria. DeKalb entered the French army in 1743 and received several promotions, becoming lieutenant-general in 1761. Some years later he was a secret emissary of the French government in America and returned to France with a report favorable to the American cause. In 1777 he was persuaded by American representatives in Europe to join Lafayette's expedition, and upon arrival in America he was made a major-general. He served with credit throughout the war, was second in command to General Gates in the South and commanded the American forces at Camden. In this engagement he received eleven wounds, from which he died.

DE KO'VEN, REGINALD (1861-1920), an American musician, one of the foremost composers of light opera. He was born at Middletown, Conn., studied at Stuttgart and Paris, and later attended Oxford University, where he was graduated in 1879. In 1887 he produced a successful light opera, *The Begum*, but his reputation became firmly established with the production of *Robin Hood*, in 1890. This was followed by many other works of similar style, including *Don Quixote*, *The Fencing Master*, *Rob Roy*, *The Mandarin* and *The Red Feather*. In 1917 a grand opera composed by him, *The Canterbury Pilgrims*, was produced at the Metropolitan Opera House in New York. De Koven has also composed a number of well-known songs remarkable for their sweetness of melody; *O Promise Me* is the most popular. Others include *Margery Daw*, *A Winter Lullaby*, *Indian Love Song* and *Ask What Thou Wilt*. Just before his death he wrote the opera *Rip Van Winkle*.

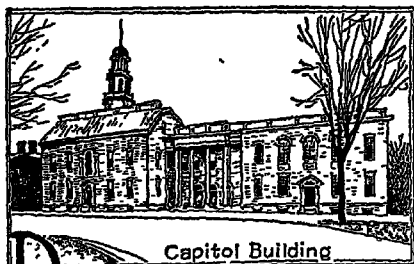
DELAEROIX, FERDINAND VICTOR EUGENE (1798-1863), a celebrated French painter, leader of the Romantic school, who excelled in depicting historical scenes. Critics frequently attacked him for his departure from the conventional classic style, but he attained a secure place in art for all time. He traveled widely, and the varied subjects of his pictures gave evidence that he utilized well his contacts. Many of his canvases are in

the Louvre, among them *Algerian Women*, *Jewish Wedding in Morocco*, *Entry of Crusaders into Constantinople*. In New York's Metropolitan Museum are *Abducting Rebecca* and *Christ on Lake Genesaret*.

DELAND', MARGARETTA WADE CAMPBELL (1857-), one of the foremost American novelists of the modern period. She was born in Allegheny, Pa., and was educated in private schools. She taught drawing in New York until 1880, when she married and removed to Boston. Her first novel, *John Ward, Preacher* (1888), was widely popular. Among her other books are *Old Chester Tales*, *Dr. Lavender's People*, *The Awakening of Helena Richie*, *The Iron Woman*, *The Hands of Esau*, and *The Rising Tide*.

DE LA RAMEE, *de lah rah may'*, LOUISA. See RAMEE, DE LA, LOUISA.

DELA ROCHE, *de la rosh'*, PAUL (1797-1856), probably the greatest painter of the French school. He studied landscape painting for a short time, but applied himself afterward to historical painting and rapidly rose to eminence. His subjects are principally taken from French and English history. There is little real feeling or sentiment in his works, but the pictorial effect is present to a high degree. Among his well-known pictures are *Death of Queen Elizabeth*, *Princes in the Tower*, *Joan of Arc* and *Napoleon at Fontainebleau*.



DELAWARE, one of the original thirteen states and the first to ratify the Constitution of the United States. It is next to the smallest state in the Union; its size is nearly twice that of Rhode Island. Delaware is one of the Middle Atlantic group of states. Its northern boundary forms the arc of a circle, determined by a twelve-mile radius from the center of New Castle, to settle a boundary dispute. The Delaware Bay and River and the Atlantic Ocean are on the east; Maryland is on the south and west.

The popular name of the state is the **BLUE HEN STATE**, and Delaware soldiers in the Revolutionary War were called the "Blue Hen's chickens." The area is 2,370 square miles, of which 405 are water. In 1930 the population was 238,880, an average of 121 to each square mile, as compared with 41 per square mile for the entire country. Only nine of the states have a greater number of people to the square mile. The state ranks forty-seventh in area and forty-sixth in population. The peach blossom is the state flower.

Surface. Except a small, hilly section in the north, the surface is uniformly low and level and is generally sandy. In the extreme south there is much swamp land. The highest elevation is only 440 feet above the sea. The coast of Delaware Bay is marshy, and some of the land is enclosed by dykes and thus rendered tillable. The Atlantic coast has many sand beaches enclosing shallow lagoons. Near the western boundary, a low wooded ridge extends southward from the Christina and Brandywine rivers. Cypress Swamp, on the southern border, is twelve miles long and six miles wide. The height of land between Chesapeake and Delaware bays divides the state into two drainage areas. To the west of this divide the rivers flow into the Chesapeake Bay. To the east they flow into the Delaware River, Bay and the Atlantic. The rivers of Delaware, though numerous, are all small.

Climate. The climate is mild and healthful. Autumn is particularly mild, and frosts seldom occur before the middle of October. The mean temperature is about 55°. The average rainfall is about forty-five inches.

Agriculture. Delaware is an agricultural state, notwithstanding it lies in the great industrial belt of the United States. Improved farm lands occupy eighty-five per cent of its entire area, nearly as large a proportion as in any other state. Delaware some years ago seemed to be the natural home of the peach, but apples, small fruits and vegetables are now raised in greater abundance for the great city markets. Delaware's early apple crop is large and is in great demand. Although fruit-growing is the chief industry, tomatoes, cereals, peas, beans and clover seed are also important products. The total value of farm products, at average prices, is about \$15,000,000 per year. Corn and wheat are the most important field crops.

Other Industries. The principal manufacturing factories of Delaware are located in Wilmington. Here are large leather-tanning factories, passenger-car and fiber factories and plants for the finishing of cotton fabrics. Large ship-building yards, foundries and machine shops are here. Near Wilmington are the great plants of the DuPont de Nemours Company, manufacturers of powder and other explosives, chemicals, lacquer and leather substitutes, and synthetic dyes. Other important industries in the state are canning and preserving work. The mineral resources consist chiefly of clay products, stone, sand and gravel.

The fisheries of Delaware are important. Oysters, menhaden, shad, sea trout and perch are of chief commercial value. Factories derive oil from the menhaden which is of commercial value, both as oil and as fertilizer.

Transportation. Numerous railways bring the coal and iron fields of Pennsylvania within easy reach and render the markets of Philadelphia and New York available. The principal roads are the Baltimore & Ohio, the Pennsylvania and the Philadelphia & Reading. Good harbors at Wilmington, New Castle and Lewes, and the navigable waters of the Delaware River and Bay encourage coastwise and internal trade. The state has over 1200 miles of improved highways.

Government. The governor is elected for four years and may be reelected, but is not eligible for a third term. The legislative department consists of a senate of seventeen members and a house of representatives of thirty-five members. The members of the senate are elected for four years and of the house for two years. The judiciary consists of six state judges, one of whom holds the office of chancellor and another that of chief justice. The judges are appointed by the governor for terms of twelve years and confirmed by the Senate.

Progressive legislation in Delaware includes the passage of workmen's compensation acts, the strengthening of child labor laws, and the enactment of a state income tax law with an exemption of \$1000.

Education. The state provides for the purchase and use of free text-books in the public schools. Separate schools are provided for white and colored pupils. The principal institution of learning, the Uni-

Items of Interest on Delaware

It lies on the Coastal Plain and is generally level and relatively low, the average elevation above the sea being about fifty feet; in the extreme north the country is rolling, with hills, moderately deep valleys, and rapid streams.

In general the soils of the northern part of the state are clays, sometimes mixed with loams, of the central part mainly loams, and those of the southern part sands.

The annual rainfall averages forty to forty-five inches, but it is slightly greater on the coast than inland.

The forests, which were once extensive, are now of importance chiefly for railway ties and wharf pling.

The shipyards at Wilmington have produced many large ocean steamships.

Oysters and menhaden are the principal product of the state's fishing industry.

The mining industry is inconsiderable, being principally in clay products, stone, sand and gravel.

Fruit-growing is one of Delaware's important industries. There are many canning and preserving factories in the state.

Questions on Delaware

How does Delaware rank in size?

Describe its surface.

What kinds of soil are found?

What minerals are found? In what part of the state?

What is the chief product of the fisheries?

Is the fishing industry important? Why do you think so?

In which section is the land most valuable for agricultural purposes?

What is the total annual value of farm products?

Name the leading crops.

What are the principal manufactures?

How many miles of railway has Delaware?

What industries make Wilmington an industrial center?

versity of Delaware, is located at Newark. A State College for Colored Students is at Dover. Near Middleton is St. Andrews School for Boys, and in Wilmington are excellent private schools, including Friends School and Tower Hill School.

State Institutions. The Associated Charities of Wilmington cooperate in the direction of many philanthropic institutions. These include the Home for Friendless Children, the Home for Aged Women, Saint Joseph's School for Orphan Colored Boys, the Florence Crittenton Home, the Delaware Industrial School for Girls, Home of Merciful Rest, and the Layton Home for Colored Persons, all at Wilmington. There are also several institutions in Dover and Marshalltown, and the Delaware Hospital for the Insane at Farnhurst. The Delaware State Health and Welfare Commission has general charge of the work for the prevention and cure of tuberculosis.

History. Lord Delaware sailed into Delaware Bay in 1611, but no settlement was established until 1631, when the Dutch founded a trading post near the present site of Lewes. This settlement was soon destroyed by the Indians, however, but in 1638 the Swedes built a fort at the present site of Wilmington, which became the first permanent settlement in what is now Delaware. The colony of New Sweden lasted for seventeen years when it was conquered in 1655 by the Dutch under Peter Stuyvesant. The latter were in turn supplanted by the English in 1664. After that it became a bone of contention between rival English claimants, namely, the colonies of Maryland and Pennsylvania, the latter finally gaining control in 1685. In 1701 it was granted a separate assembly, two years later it was reunited to Pennsylvania, but in 1704 was recognized as a separate colony.

During the Revolution, Delaware was loyal to the patriot cause, formed an independent state government in 1776, and was the first to ratify the Federal Constitution (December, 1787). Under the republic it rapidly gained in population and wealth. Though a slave-holding state, it remained faithful to the Union in the Civil War, although it furnished many recruits to the Confederate army. At the close of the struggle, the legislature firmly resisted the passage of the 13th, 14th and 15th amendments.

The Democratic party uniformly con-

trolled the state government from the eighteen fifties to the eighteen nineties. Since the turn of the century the Republican party has consistently been in power with few exceptions. From 1860 to 1892 inclusive Delaware's electoral votes were cast for the Democratic presidential candidates except in 1876, and from 1896 to 1932 the state's electoral votes were cast for Republican presidential candidates except in 1912 when Woodrow Wilson carried the state at his first election.

Related Articles. Consult the following titles for additional information
 Chesapeake Bay Dover
 Delaware, Thomas W Wilmington
 Delaware Bay

DELAWARE, a tribe of Indians belonging to the Algonquian family, called by themselves *Lenni-Lenape*, meaning *real men*. They had to leave their original settlements in Eastern Pennsylvania and New Jersey about the middle of the eighteenth century and go farther west. Later they were removed to the Indian Territory. The few hundreds that survive are scattered among various tribes. William Penn made his celebrated treaty with the Delaware, and their famous chief Tamanend gave his name to the political organization in New York known as Tammany.

DELAWARE. OHIO, the county seat of Delaware County, twenty-four miles north of Columbus, on the Olentangy River and on the Cleveland, Cincinnati, Chicago & Saint Louis, the Hocking Valley and the Pennsylvania railroads. The Ohio Wesleyan University, a leading Methodist school, is located here. The city has a Federal building and a public library and contains railroad shops, foundries, flour mills and other manufactories. Population, 1930, 8,675.

DELAWARE, or **DE LA WARE**, THOMAS WEST, Lord (1577-1618), the first British colonial governor of Virginia colony, in whose honor Delaware River, Delaware Bay and the state of Delaware were named. At the age of twenty-five he became a member of Queen Elizabeth's privy council, and in 1609 of the Council of Virginia in England. In the following year he was sent to Virginia as governor and captain general under the charter of 1609, arriving just as the discouraged colonists were about to embark for England. He displayed ability and energy as an executive and helped firmly to establish the colony on a prosperous basis. In 1611 he

left Virginia for the West Indies in search of health, but was driven by storm into Delaware River. He later returned to England and died while on another voyage to America.

DELAWARE BAY, an arm of the Atlantic Ocean between the states of Delaware and New Jersey. It is about forty miles long, and its greatest width is twenty-five miles. At the entrance, near Cape Henlopen, is situated the Delaware Breakwater, which affords vessels a shelter within the cape. This breakwater was erected by the Federal government and cost about \$3,000,000. See **DELAWARE RIVER**.

DELAWARE RIVER, a comparatively short but very important commercial waterway of the United States. It rises in the Catskill Mountains in New York, separates Pennsylvania from New York and New Jersey, and New Jersey from Delaware, and loses itself in Delaware Bay. It has a course of about 410 miles and is navigable for large vessels to Philadelphia and for smaller craft to the head of tide water at Trenton. Its chief tributaries are the Schuylkill and the Lehigh.

DELAWARE WATER GAP, a narrow gorge in the Kittatinny Mountains, on the borders of Pennsylvania and New Jersey, through which the Delaware River flows. The mountains on each side rise to a height of 1,400 feet above the water and form very beautiful scenery.

DELCASSE', *del ka say'*, THEOPHILE (1852-1923), a French statesman, prominent in World War politics. For more than twenty years he held conspicuous offices under the government. In 1914 he returned to France from Russia, to which country he had been sent as ambassador in 1913. On the outbreak of the World War he assumed charge of foreign affairs, a post he had previously held, and remained in it until October, 1915, when he resigned. It was Delcassé who was chiefly instrumental in bringing about the friendly understanding among England, France and Russia, which had such important bearings on the war in 1914.

DELFT (formerly Delf), **NETHERLANDS**, a picturesque town on a canal between Rotterdam and The Hague. Among the buildings are the townhall; the Prinsen-hof, now a museum, the scene of the assassination of William the Silent; the old Reformed church; the new church, containing monuments to

William I and Hugo Grotius and the burial vaults of the present royal family. The town has long been famous for its earthenware, made in imitation of Chinese and Japanese porcelains, and known as Delftware. Following a period of decline, the making of this pottery enjoyed a revival after the opening of the twentieth century. Population, 1933, 51,700.

DELHI, *del'e*, INDIA, capital of the Indian province of the same name, and seat of the British government for all India, so declared when King George visited India in 1911-12 and was crowned Emperor of India at a great durbar held there. It is situated on the Jumma River, about 950 miles from Calcutta, the former capital. The city was first founded by the Emperor Shah Jehan and as the capital of the Mogul Empire in the seventeenth century was one of the most magnificent cities in the world. Remains of its former glory are still evidenced in such fine relics as the Jumma Masjid, the work of Shah Jehan, built of red sandstone and white marble, also the black mosque and the crumbling tombs of the Imperial family, pavilions, baths and mausoleums, covering a vast tract near the site of the present city, and in the imperial palace built by the Great Mogul. This last was partly demolished to make room for military barracks, but the great towers, gilded minarets, ornate pavilions and marble dome still stand.

The present city is flanked on three sides by a stone wall thirty feet high, and within this are many modern buildings, some of them of European architecture. The government college, the Residency and a Protestant church are among the modern architectural features.

Its political prominence has tended to make Delhi a cosmopolitan city, with many European characteristics. Modern civilization has done much to overcome caste prejudice among the inhabitants, thousands of whom are employed in the flour, cotton and sugar mills. Educational opportunities have increased in recent years, and with greater enlightenment has come civic pride and a desire for commercial progress. The political unrest which formerly disturbed the peace of mind of English residents has largely disappeared, and in its place has come a general recognition of the efficiency of the present system of government. Population, 1931, 447,442.

DELILAH, one of the famous women of the Old Testament, the temptress of Samson. She prevailed upon him to reveal to her the source of his strength, which was his long hair, and while he lay asleep she called men who cut off his locks. Then she allowed his enemies, the Philistines, to capture and blind him (see *Judges XVI*). Their story has been effectively presented in dramatic form by Saint-Saens in his opera, *Samson and Delilah*.

DELIRIUM, the condition of being "out of one's head," due to high fever, injury to the head, or to such nervous diseases as epilepsy, Saint Vitus's dance and hysteria. In delirium the speech is disordered and incoherent, the emotions are excited and the power to reason is lost. Usually-familiar faces may not be recognized. In violent attacks of delirium the patient may do himself bodily injury, if not carefully watched. The onset of delirium during an attack of any disease is a very serious symptom. See **DELIRIUM TREMENS**.

DELIRIUM TREMENS, *tré'mens*, an affection of the brain, caused by excessive drinking of alcoholic liquor. The principal symptoms of this disease are delirium and trembling. The delirium is a constant symptom, but the tremor is not always present, or, if present, is not always perceptible. Frequently the sufferer is thrown into paroxysms of terror, by thinking he sees snakes or other animals, or the most frightful and grotesque objects. The treatment of this distressing malady should be supervised by a reliable physician. Usually an attack requires the administration of powerful drugs.

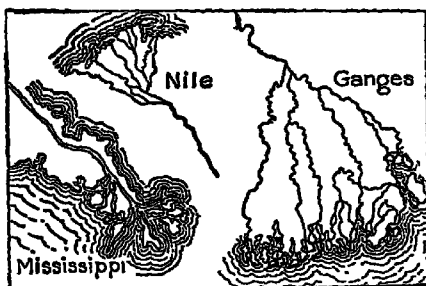
DELLOS, an island of great renown among the ancient Greeks, the fabled birthplace of Apollo. It was a center of his worship and the site of a famous oracle (see **ORACLES**). It is the central and the smallest island of the Cyclades group, in the Aegean Sea. Delos is now deserted except for the few who visit it for its ruins.

DELPHI, *del'fi*, a town in ancient Phocis, Greece, originally called Pytho and famous for its oracle. The oracles were delivered by a priestess, who sat on a tripod at the entrance to a cavern, on the slope of Mount Parnassus, from which issued cold vapors, supposed to be the prophetic breath of the god Apollo. The oracular utterances were always obscure and ambiguous; yet they served, in the hands of the priests, to regulate

and uphold the political, civil and religious relations of Greece. Delphi was also one of the meeting places of the Amphictyonic Council of the Greeks (see **AMPHICTYONIC COUNCIL**), and near it were held the Pythian games. See **ORACLES**.

DELSARTE, *del'sahrt'*, FRANÇOIS ALEXANDRE (1811-1871), a musician and investigator, born at Solesmes, France. He composed a few melodies and wrote several romances, and taught singing and declamation. He was best known as the founder of a school of physical culture (which see).

DELTA, the name given to low island plains formed at the mouth of a river where the stream separates into two or more branches. The term originated with the Greeks, who first applied it to the plain



THREE GREAT DELTAS

formed by the mouth of the Nile, because of its triangular shape, resembling the Greek letter Δ , called *delta*.

Deltas are caused by the meeting of the river's current with an inflow from the sea, so that the outflowing current is slackened, and most of the silt which it holds in suspension is deposited. If the sea is quiet, this action soon builds up a plain which reaches to the surface. Vegetation takes root from this, and in time it becomes firm land. Deltas will not form where the sea is agitated by strong winds or where tides produce high waves, because these movements wash away the sediment; hence deltas never exist in broad estuaries like the Gulf of Saint Lawrence. The most noted deltas in the world are at the mouths of the Nile, the Mississippi, the Ganges, the Brahmaputra, the Hoang-ho, the Po and the Mackenzie. Some of these are very large, that of the Brahmaputra having an area of 50,000 square miles, and that of the Nile, about 20,000 square miles. The

land of the deltas is usually very fertile, and if of sufficient elevation to drain, it is unusually valuable for agricultural purposes. See RIVER; EROSION.

DELUGE, *del'uge*, the name given to the great flood that covered the earth in the time of Noah, an account of which event is given in chapters six, seven and eight of the book of *Genesis*. According to the Bible narrative, the people of the earth had become so wicked that God sent a deluge which covered "all the high hills that were under the whole heaven" and destroyed all living things except those which previously had entered the Ark built by Noah. Besides Noah and his family, the Ark sheltered one male and one female of every species in the animal kingdom. After 150 days the waters began to subside, and during the seventh month the Ark rested on Mount Ararat. Then Noah sent out a dove to see if the waters had disappeared. When the bird returned for food and shelter he replaced her in the Ark and kept her for seven days. After a second trip the dove returned with an olive leaf, and when she was sent out a third time she returned no more. Then Noah knew that the waters had dried up, and that soon he and his family could return to their homes.

DEMAND AND SUPPLY. See SUPPLY AND DEMAND.

DEMARCATION, *de mar ka'shun*, LINE OF. Very soon after the discovery of the New World a dispute arose between Spain and Portugal over territorial rights in South America. The matter was referred to Pope Alexander VI for settlement. He drew a line on the map of the Americas running north and south at a distance of 600 miles west of the Azore and Cape Verde islands. To Spain he assigned all lands west of that line which Spaniards had discovered or might later find, and to Portugal he assigned all lands acquired in like circumstances to the east of that line. The location of the line was later changed by the two nations to 2,220 miles west of the Cape Verde Islands. Thus is explained why Portuguese is today the language of Brazil, and Spanish of all other South American countries. The ownership of the Moluccas and Philippines was settled in a similar way.

DEMENTIA. See INSANITY.

DEMETTER. See CERES.

DE MILLE, CECIL BLOUNT (1881-), an actor, playwright, and since 1913 identi-

fied with the motion-picture industry as producer. His stage success came as a producer of plays for David Belasco, and the genius there displayed he carried to the silent screen and then to the talking pictures. He gave to the public more than fifty pictures, and rose to the top of his profession as president of his own film company. Some of his pictures were massive productions, such as *The Ten Commandments* and *The King of Kings*.

DEMOCRACY, rule by the people. See GOVERNMENT.

DEMOCRATIC PARTY, the name given to the party in American history which was the successor of the Republican or Democratic-Republican or Anti-Federalist party, its fundamental doctrine being the application of the most democratic principles to the government. Specifically, it urged the strict construction of the Constitution and the strengthening of the state governments at the expense of the national government. It first came to power in 1801, with the election of Jefferson, and retained control of the national government continuously from that time until 1825, when John Quincy Adams, a former Democrat, but recently converted to the principle of loose construction and centralization, was elected over Andrew Jackson, the Democratic candidate. It returned to power in 1829, with the election of Jackson, was defeated in 1841 by William Henry Harrison, the Whig candidate, and again in 1848 by Taylor, a Whig, owing to a quarrel among New York State Democrats (see BARNBURNERS). Thereafter, it was continuously successful until the election of Lincoln in 1860.

The issue of slavery and the Civil War caused a serious division in the party, and it did not again become united until ten years after the war, when, with Samuel J. Tilden as a candidate, the party gained a majority of the popular vote, though Tilden was defeated by the electoral commission (see ELECTORAL COMMISSION). In 1884 its candidate, Grover Cleveland, was chosen president, was defeated in 1888 and was again elected in 1892.

From 1896 to 1912 the party was in opposition, but returned to power in 1912 (Wilson, 1913-21), and again in 1932 with the election of Franklin D. Roosevelt. See POLITICAL PARTIES.

For a detailed history of the party, its principles and its relations to other parties, see Political Parties in the United States.

DEMOSTHENES, *de mos'the neez* (about 383-322 B. C.), the most eloquent orator of antiquity, perhaps the greatest of all time, and one of the noblest characters in history. His father left him a considerable fortune, of which his guardians attempted to defraud him. At the age of seventeen he conducted a suit against them himself and gained his cause. His success led him to study oratory and, though his lungs were weak, his articulation defective and his gestures awkward, by perseverance he at length surpassed all other orators in power and grace. Against Philip of Macedon, who was attempting to place himself at the head of the Greek states, he directed his famous condemnatory orations known as the *Philippics*.



DEMOSTHENES

He was present at the Battle of Chaeronea (380 B. C.), in which the Athenians and Boeotians were defeated by Philip and Greek liberty was crushed. On the accession of Alexander in 336, Demosthenes tried to stir up a general rising against the Macedonians, but Alexander at once adopted measures of extreme severity, and Athens sued for mercy. It was with difficulty that Demosthenes escaped. In 324 he was imprisoned on a false charge of having received a bribe from one of Alexander's generals, but managed to escape. On the death of Alexander in the next year he returned from exile, but when the Greeks were again defeated by the Macedonians he was forced to leave. This time he took refuge in the temple of Poseidon, in the island of Calanria, on the coast of Greece. Here it is believed he poisoned himself to escape the emissaries of Antipater.

DEMURRER, *de mur' er*, a pleading in a case at law which seeks the court's judgment as to (1) whether the facts, even if admitted, are not insufficient to sustain the opposing claim, or (2) whether some other defect in the presentation of the case does not constitute a legal reason why the opposing party should not be allowed to proceed.

DENARIUS, a Roman silver coin, originally worth ten, and later sixteen, of the pieces called *as*, the change being made when the weight of the *as* was reduced, on account of the scarcity of silver. The denarius was equivalent to about fourteen cents of Ameri-

can and Canadian money. There are also a gold denarius, equal in value to twenty-five silver ones.

DENATURED ALCOHOL. See **ALCOHOL**, subhead *Denatured Alcohol*.

DENISON, **TEXAS**, a city in Grayson County, seventy-four miles north of Dallas, on the Frisco, the Missouri, Kansas & Texas, the Texas & Pacific, the Southern Pacific, the Kansas, Oklahoma & Gulf railroads and interurban and bus lines. It is an important railroad center in an agricultural country, producing grain, cotton, peanuts, fruits and vegetables, and it contains cotton, cottonseed oil, peanut and flour mills and manufactures of mattresses, machinery, ice and other articles. The important buildings include the Saint Francis Xavier's Academy, a Union depot and a Federal building. There are two hospitals. The town was settled in 1872, was a city in 1891, and has commission government. Population, 1930, 13,850.



A Danish peasant girl

DENMARK, the smallest of the three Scandinavian kingdoms of Europe, the others being Norway and Sweden. It consists of the continental peninsula of Jutland and a number of islands, of which the most important are Funen and Zealand. On the latter is the northern portion of the capital city of Copenhagen; the southern portion occupies the adjacent coast of the small island of Amager. Including the Faroe Islands, north of Scotland, the Danish kingdom has

an area of 16,576 square miles, and is more than twice as large as Massachusetts. In 1930 the population of Denmark proper was 3,550,700, about equal to that of the city of Chicago. There are 214 people to the square mile, as compared with about 529 for Massachusetts.

Denmark is a kingdom in the sea, for it has but one land boundary. It is separated from Norway on the north by the Skagerrak; from Great Britain on the west by the North Sea, and from Sweden on the east by the Baltic Sea, the Sound and the Cattegat; Schleswig-Holstein, which became a part of Prussia in 1866, but was originally Danish, lies to the



Living Galloway

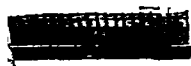
IN PICTURESQUE DENMARK

Fishing boats in one of the canals of Copenhagen; here the owners come to market their catch. Old Danish national costumes, now fast disappearing; women in Sunday apparel. Below is a typical flat Danish landscape; a rural scene on a dairy farm.

[See over.]



Keystone



IN THE FISH MAR-
KET, COPENHAGEN

Women are almost ex-
clusively the patient ven-
ders of fish here along the
Gammel-strand of the cap-
ital city.

[See over.]



south of Jutland on a boundary line less than forty miles in extent. At the close of the World War Denmark entered a claim at the Peace Conference for the return of a portion of Schleswig-Holstein—that portion still Danish in language and sentiment. The northern section, by vote of the people in 1920, again became a part of Denmark.

Surface and Drainage. The west coast of Jutland is low and sandy, while the east coast is level, contains several excellent harbors and is indented with fjords or firths, the most noteworthy being the Lymfjord, or Lumfjord, stretching across Jutland. The inland surface of Denmark is low, generally, though diversified with a range of hills across the middle part of Jutland, the highest points of which are 600 feet above sea. There are no lakes or rivers of note, the largest river being the Guden, which is less than 100 miles long.

Industries. Denmark is the poorest of European countries in mineral resources. Peat is found in the west and north of Jutland, nearly four per cent of the country being in peat bogs, but no metallic ores of any kind appear.

Agriculture is the occupation of over one-third of the people. As the formation of large estates is forbidden by law, the land is divided into numerous small farms, most of which are owned by peasants. About one-third of the land is cultivated, the remainder of the productive area is pasture and meadow land or beech forests. Danish farmers are thrifty and progressive and make extended use of up-to-date machinery. The chief crops are wheat, rye, barley, oats, mixed grain, potatoes and sugar beets. Dairying is carried on extensively and Danish dairy products are among the best in the world. Co-operative marketing is a firm reliance of the farmers. See COOPERATION, subhead.

Manufacturing is increasing in importance, though there are no single great enterprises. Porcelain is made extensively in Copenhagen, and other manufactures include locomotives, machinery, wool, linen and cotton. There are also a number of beet-sugar factories. Fishing is an important industry, the country's fishing fleet numbering in 1934 more than 15,700 vessels.

Transportation. Most of the cities are situated on the coast or on navigable rivers. Steamboats run between the islands. The first railroad was opened for use in 1847;

in 1924 there were 3,086 miles in operation, one-half belonging to the state. The exports are mostly animal and dairy products, while the imports include cereals, coal, cotton, iron, manufactures and textiles. Germany, Great Britain, United States, Sweden, Norway and Russia are the leading countries connected with the trade.

Education. Denmark has a good system of education, for education was made compulsory in 1814. The chief institution is the University of Copenhagen, founded in 1479. There are besides, twenty-one agricultural colleges, 303 technical schools, a college of pharmacy, a college of dentistry, and a Royal Academy of Arts.

Government and Religion. In government Denmark is a constitutional monarchy. The present constitution dates from 1915, by it the executive power is vested in the king, and the legislative power lies in the king and a diet, or *Rigsdag*, consisting of the *Landsting*, or upper house, and the *Folkething*, or popular chamber. The former is composed of seventy-two members, twelve of whom are appointed by the king and the rest chosen for eight years by the people. The *Folkething* is composed of 149 deputies, elected by both male and female suffrage for a period of three years. All money bills must be submitted by the government first to this body. The established religion is Lutheran, but toleration is extended to all creeds.

Colonies. Denmark's colonies are not of first importance. Iceland in 1918 was made practically independent, Greenland has a large area, but is habitable only in the lower coast region, the Danish West Indies were sold to the United States in 1917. There remain to Denmark the Faroe Islands (540 square miles and 24,200 people), which form a department in the government.

Language and Literature. The Danish language belongs to the Scandinavian branch of the Teutonic family of languages and is closely allied to the Swedish and Norwegian. It is the most modern of the Scandinavian languages, soft and rather monotonous, with shades of sound difficult for a foreigner to acquire. It is written either in the German or the Roman characters. From the long union of Norway with Denmark, Danish became the written language of the Norwegians and is still to a large extent the language of the educated classes.

The oldest Danish book is a treatise on medicine, which dates from the first half of the thirteenth century. The first really literary writings were series of ballads, which were probably composed between the fourteenth and sixteenth centuries. During the Reformation period, Christian Pedersen (1480-1554) did for the Danish language what Luther did for the German, by publishing a translation of the New Testament and the Psalter, and later, the complete Bible. Modern Danish literature begins with the period succeeding the Reformation, with hymns, scriptural dramas and moral tales. A new effort began with Ludvig Holberg (1684-1754), who infused new spirit into all branches of Danish intellectual life. He was also the founder of the Danish stage. Contemporary with him was the lyric and dramatic poet Johannes Ewald. Heiberg, critic, poet and dramatist, and Jens Baggesen (1764-1826), are the chief comic dramatists of the nation. Fresh life was again infused into Danish poetry by Adam Oehlenschläger (1779-1850), contemporary with whom was Adolph Wilhelm Schack von Staffeldt, a lyric poet of high order. The greatest names in Danish literature since Oehlenschläger have been Hans Andersen (1805-1875), who won world-wide reputation by his fairy tales; Paludan-Müller (1809-1876), and Georg Brandes (1842-1927), critic and literary historian. It was Brandes who, more than any other one man, introduced into Danish thought modern European ideals.

History. After the decline of the Roman Empire, the peoples of the Scandinavian countries began to make themselves felt throughout Europe by reason of their warlike and adventurous spirit. They conquered Normandy, successfully invaded England in the ninth century and even sent voyagers as far as America. Early in the eleventh century, Canute, king of Denmark, established a firm hold on England. He was one of the most powerful rulers of his age, and it was during his rule that Christianity was firmly established in Denmark. For three centuries following Canute, Denmark was in a state of upheaval and, although there was an occasional strong and even brilliant ruler who brought the country to something like the position it had had in Canute's time, most of the kings were weak.

Margaret, called the "Semiramis of the

North," ruled in Denmark from 1375 to 1412, and she gave the country a strong government. By the Union of Kalmar, in 1397, Denmark, Norway and Sweden were united under one sovereign, and Margaret's nephew, Eric, was appointed her heir. He proved, however, to have none of her great qualities, and he speedily lost his triple kingdom, each country choosing its own ruler. By 1448 the Danes, tired of the misrule, chose, as king, Christian of Oldenburg, who established the line which reigned until 1863. The choice of Christian as ruler, also, of Schleswig and Holstein, and the fact that the ruler of Holstein, which was a part of the Holy Roman Empire, had a voice in the German Diet, led centuries later to the most important consequences.

During the reign of Christian II (1513-1523), Sweden, under Gustavus Vasa, gained its freedom, and it was never again united to Denmark. The latter country during the sixteenth century began to have a part in European affairs, and Christian IV (1588-1648) took an important part in the Thirty Years' War. The choice of the king of Denmark was by election until 1660, but in that year the king, Frederick III, succeeded in having the kingship declared hereditary in his family.

As an ally of Napoleon, Denmark was involved in war with Sweden, England, Russia and Prussia. Copenhagen was bombarded by the British fleet in 1807, and seven years later Norway was ceded to Sweden. Holstein, feeling itself to be entirely German, had never been satisfied with the Danish rule, and when in 1846 the Danish king declared his intention of making the Danish monarchy permanently indivisible, a rebellion broke out in Schleswig and Holstein among the German element. It was put down by 1851, though it was supported by Germany. Christian VIII had in the meantime granted to Denmark an extremely liberal constitution, but this did not allay the discontent of the German element of Schleswig-Holstein, and when in 1863 Prince Christian of Glücksburg came to the throne as Christian IX, Schleswig and Holstein declared for a different ruler. Prussia and Austria determined to unite in settling the Schleswig-Holstein matter, and war was begun with Denmark in 1864. As a result Denmark was forced to resign all claims to Schleswig and Holstein, and two years later the duchies passed finally under the control

of Prussia Denmark, through the marriage of the children of Christian IX into many reigning families of Europe, came during the latter half of the nineteenth century into very close relationship with many of the European powers. In 1906 Christian IX was succeeded by his son, Frederick VIII, who died in 1912. The successor of Frederick VIII was Christian X

In 1914, upon the outbreak of the World War, the position of Denmark and of its sister Scandinavian countries became perilous, but strict neutrality was well maintained by united action of Denmark, Sweden, and Norway For more than a decade Iceland had peacefully sought complete independence, its demand was conceded in 1918, at which time the Icelanders accepted the Danish king as their ruler until 1940.

Related Articles. Consult the following titles for additional information

Andersen, Hans C	Greenland
Brandes, Georg	Iceland
Canute	Jutland
Christian IX	Northmen
Christian X	Schleswig-Holstein
Copenhagen	Thorwaldsen, Bertel
Faro Islands	World War
Frederick VIII	Zealand

DENSITY, in physics, the quantity of matter contained in any given substance per unit of its volume. When a body, mass or quantity of matter is spoken of, its weight is always understood, that being the measure of the density Two bodies may be of the same size, but of different density A cubic inch of snow is not so dense as a cubic inch of ice. If the latter is fifty times the weight of the other it has fifty times the density If the snow is compressed until it is one-fiftieth its former size it will be of the same density as the ice Hence the maxim: density is directly proportional to the quantity of matter and inversely proportional to the bulk or magnitude. See GRAVITY, SPECIFIC

DENTAL SCHOOLS, professional schools founded for the purpose of giving technical training in dentistry and dental surgery. The first school of this sort in the world was established at Baltimore in 1839 Six years later the Ohio College of Dental Surgery was founded, and this was followed by a school in Pennsylvania; then others were organized in rapid succession Most of the larger universities now maintain dental departments These departmental schools and the independent schools in the United States number about sixty. The re-

quirements for admission in most of these schools are a high school course or its equivalent, but there is a growing belief that a college course should be the minimum admission requirement Most of the best schools require four years' study and practice for graduation See DENTISTRY

DENTIPHONE. See AUDIPHONE

DENTISTRY, the art of cleaning, extracting, repairing and replacing teeth There are two very distinct departments in dentistry, the one being *dental surgery*, the other what is known as *mechanical dentistry*. The first requires an extended medical knowledge on the part of the practitioner, as, for instance, a knowledge of diseases whose effects may reach the teeth, of the connection between the welfare of the teeth and the general system, as well as ability to discern latent diseases of the mouth The chief operations in this department are *scaling*, or removing the tartar which has accumulated on the base of the teeth, *regulating*, the restoring of overcrowded and displaced teeth to their proper position; *filling*, the filling up of the hollow of a decayed tooth to prevent the progress of decay; *extracting*, a process requiring muscular power and delicacy of manipulation

The second department, mechanical dentistry, is concerned with the construction of artificial substitutes for lost teeth and requires much mechanical skill, it being a very delicate task to give artificial teeth a perfectly natural appearance in shape and color. The actual construction of the teeth, however, has passed largely into the hands of the manufacturers, and the dentist has only the selecting, fitting and fixing to do Also, laboratories in all large cities relieve the practicing dentist of all mechanical work in connection with the making of plates, inlays, bridges, crowns, etc.

The terror inspired by the dentist's drill was practically eliminated by an announcement in 1936 by Dr L L Hartman of Columbia University of a formula which would remove pain from tooth repair. The formula was given free to the profession as the discoverer's contribution to the welfare of humanity It is now true that tooth repair may be about as painless as tooth extraction The use of nitrous oxide and oxygen for extractions induces unconsciousness with no distressing after-effects See TEETH, HARTMAN'S SOLUTION.

DENVER, COLO., a city located on a plain one mile above the sea, in a region famed for the beauty of its scenery and the attractiveness of its climate. It is the capital and metropolis of the state, and the county seat of Denver County, and lies nearly midway between San Francisco and Chicago, being 1,457 miles east of the former, and 1,050 miles west of the latter. New York City is 2,025 miles east. About twelve miles to the west rise the foothills of the Rocky Mountains, and in the clear air of that region almost every day of the year a chain of picturesque summits may be seen for a stretch of 200 miles, extending north and south. The average annual rainfall of Denver is about fourteen inches, and the sun shines 275 days of the year. The temperature for the hottest days is 72°, on the average, and in January it averages 29°.

General Description. The city has an area of sixty square miles, and is divided by the South Platte River and Cherry Creek into East, West and North Denver. With its miles of broad, shaded streets, lined with substantial homes and buildings, it presents a very attractive appearance. Disintegrated granite and asphalt are used extensively for paving purposes, and there are many beautiful drives traversing and connecting the parks and leading to the mountain resorts in the vicinity. Of the public parks, with a total acreage of over 1,000, City Park (320 acres) is the most pretentious. It has as special features a lake, zoological gardens, a museum of natural history, an aviary and a speedway. Other attractive parks are Cheesman, Berkeley and Washington, and there are about a dozen children's playgrounds. The street car service is excellent, and the supply of pure water from the mountains is abundant.

Important Buildings. The most prominent structure is the state capitol, occupying an eminence in the east-central part of the city and constructed of Colorado granite at a cost of \$2,800,000. Among other notable edifices are the United States Mint, the City and County building, a spacious Auditorium, which accommodates 12,000, a Federal building, erected at a cost of \$2,000,000, a Union Depot and the U. S. Customs building. The many handsome churches include Trinity Methodist Episcopal and Roman Catholic (Immaculate Conception) and Episcopal (Saint John's) cathedrals.

Institutions. Among the important institutions of higher learning are the University of Denver, under Methodist control, Regis College, Westminster Law School, University of Colorado School of Medicine, Colorado Woman's College and Loretto Heights College. Libraries are numerous and include, besides those connected with the colleges and the well-equipped Denver public library, the state library and that of the supreme court. The city also possesses a number of excellent sanatoriums and hospitals.

Industry and Commerce. The industries dependent upon or connected with mining and live-stock raising are of great and increasing importance. There are large establishments for the smelting of lead, copper, iron, gold, silver, radium and uranium, and their annual output has a value approximating \$8,000,000. The stadium built to house the annual stock show, which is second only to that held in Chicago, cost \$250,000, and the slaughtering and meat-packing plants do a thriving business. Other important plants include sugar beet factories, foundries and machine shops, railroad construction and repair shops, manufacturing of mining machinery, and numerous factories producing a wide variety of articles in general use.

The city is the largest distributing point in the Rocky Mountain section, and carries on a large wholesale jobbing trade. Denver is an important railroad center. It is served by the Union Pacific, the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Colorado & Southern, the Denver & Rio Grande Western and the Denver & Salt Lake. The Denver Municipal Airport—"a mile high and a mile square"—is an important station on the nation's airways. Several motor truck and bus lines add to the city's transportation facilities.

History. The city was settled in 1858 as Auraria, on the west side of Cherry Creek, and as Saint Charles, on the east side. In the following year the rival villages were united and incorporated as a city and named Denver, for General J. W. Denver, who at the time was governor of the territory of Kansas, which then included Colorado. It was made the capital of the territory of Colorado in 1867, and was the county seat of Arapahoe County until 1902, when it became "The City and County of Denver" and

was vested with unusual powers and prerogatives, including a form of initiative and referendum. Population, 1920, 256,491, in 1930, 287,861.

DENVER, UNIVERSITY OF, an institution of higher learning, founded by Governor John Evans at Denver, Colo., in 1864, under the name of Colorado Seminary. Since 1880, when it was reorganized, it has borne its present name. It is under Methodist control. The main campus is at University Park, a suburb of Denver. Here are located the college of liberal arts, the graduate school, and the school of science and engineering. In Denver are situated the schools of law, commerce, art and librarianship. The faculty numbers about 135 in normal years, and the student enrollment about 3,500. The library of the University contains over 50,000 volumes.

DEPARTMENT, one of the ninety territorial divisions of France, which since 1790 have replaced the old provinces. Each department is subdivided into *arrondissements*, or congressional sections. These are subdivided into *arrondissements*, or electoral districts, and the cantons into *communes*. At the head of each department is a *prefect*, appointed by the President of the republic.

DE PAUW, de paw', UNIVERSITY, a Methodist Episcopal institution of higher learning, founded at Greencastle, Ind., in 1837, and named for W. C. De Pauw, by whom it was liberally endowed. The institution comprises a college of liberal arts and a school of music. In 1917 two new buildings were erected—Rector Hall, a dormitory for women, and an administration building, the Studebaker Memorial. The institution has about one hundred instructors, more than 1,600 students and a library of 75,000 volumes.

DEPEW, de pu', CHAUNCEY MITCHELL (1834-1928), an American orator, lawyer and legislator, born in Peekskill, N. Y., and graduated at Yale University in 1856. He has held public offices, among them that of secretary of state of New York, and has been prominent as a railway attorney. From 1899 to 1911 he was United States Senator from New York. Depew's reputation rests chiefly upon his ability as a public speaker, especially on festival occasions.

DE QUINCY, de kwin'sy, THOMAS (1785-1859), a celebrated English author, born in Manchester. In 1803 he matriculated at Ox-

ford, and it was in the second year of his course there that he began to take opium in order to relieve severe neuralgic pains. A habit was formed which gained strong hold on him, but after years of indulgence in it he was able partially to overcome it and do regular work.

On leaving college he settled at Grasmere, Westmoreland, near Wordsworth and Southey, and there devoted himself to literary work, reading voraciously and writing for the *London Magazine*, *Knight's Quarterly Magazine* and latterly *Blackwood's Magazine*. From 1828 to 1840 he lived in Edinburgh, then removed with his family to Lasswade. His *Confessions of an English Opium Eater*, which was published in the *London Magazine* in 1821, first won him wide notice, and it has remained his chief contribution to literature. Among his other works are *Murder Considered as one of the Fine Arts*, *The English Mail Coach*, *Joan of Arc*, *Literary Reminiscences*, in which he deals with Lamb, Coleridge, Wordsworth and Southey, as well as Shelley, Keats, Goldsmith, Pope and others, and a very interesting series of *Autobiographic Sketches*.

DERBY, (pronounced *dahr'by* in England), capital of Derbyshire, England, and an important commercial center. It is beautifully situated on the Derwent River, forty-five miles northeast of Birmingham, and is in direct rail and water communication with all parts of England. The principal manufactures are lace, silk, cotton, paper, and porcelain. All public utilities are economically and efficiently managed by the city. Derby is one of the oldest towns in England and is supposed to owe its origin to an ancient Roman station, *Derventio*, which was situated on the opposite side of the river. Population, 1931, 142,406.

DE RESZKE, de resh'ke, the family name of two brothers who won fame as singers in grand opera. Both were born in Poland.

Jean de Reszke (1850-1925) became one of the greatest tenor stars of his time. His voice early attracted attention, and after studying under eminent instructors he made his debut in Venice in 1874 as a barytone. The appearance was far from a success, and he retired, reappearing in 1879 at Madrid in the tenor rôle in Massenet's *Herodiade*. Thereafter his career was a succession of great triumphs, for he not only possessed a beautiful voice, but he was gifted with

dramatic ability, and his appearance was very pleasing. He was popular both in Europe and America, appearing in *Aida*, *The Huguenots*, *Faust*, *Lohengrin* and other favorite operas. In 1904 he retired from the stage.

Edouard de Reszke (1855-1917) was a bass singer of great ability and popularity. He made his debut in Paris in 1876. After 1884 he made several tours of the world, singing in leading operatic rôles, and for more than ten years he was engaged almost continuously with the Metropolitan Opera Company of New York City. He died on his estate in Poland, to which he had retired in order to help his suffering countrymen during the World War.

DERRICK, a device for lifting heavy weights and moving them short distances. It is the most common form of the crane (which see). The derrick usually has a tall mast, supported by ropes attached to its top and anchored to the ground. In the foot of the mast is a strong iron pin, which fits into a socket in the base upon which it rests. A boom is attached to the mast a few feet from the ground and can have its upper end lowered or raised as desired. The boom contains the tackle blocks used in lifting the weight (see **BLOCK**). A rope connects the tackle block with a system of wheel work at the foot of the mast, to which the power is applied. The weight is moved by turning the mast and thus swinging the boom around.

DERVISH, *dur'vish*, a general term applied to any Mohammedan religious fanatic distinguished by certain observances and practices. Some of the dervishes lead solitary lives, while others live in monasteries. They are respected by the common people, and the mendicants among them carry a wooden bowl into which the pious cast alms. One of their forms of devotion is dancing, or whirling about; another is shouting or howling, uttering the name *Allah*, making violent motions of the body, till they work themselves into a frenzy and sometimes fall down foaming at the mouth. They are credited with miraculous powers and are consulted for the interpretation of dreams and the cure of diseases.

DESCARTES, *da kahrt'*, RENE (1596-1650), the "father of modern philosophy." He was educated at the Jesuit College at La Flèche, where he gave evidence of remarkable intellectual power. After spending five

years in Paris and eleven years in traveling and as a soldier, he settled in Holland, where he developed his philosophical system.

Early in life Descartes recognized the inconsistencies of the various systems of philosophy and sought to found an entirely new system. Asserting that all the knowledge of his day was without firm foundation, he decided to begin his speculations by doubting everything that could be doubted. The only incontestable fact to him was that of his own existence, proof of which was furnished by the fact that he doubted. Hence he begins with the proposition: I think, therefore I exist (*Cogito, ergo sum*). Satisfied with this criterion of the certitude of his existence, he argued further that God exists,asmuch as the idea of an absolutely perfect being could not originate in finite mind unless that mind were a part of the perfect and infinite and conscious of itself. See **PHILOSOPHY**.

DESCHANEL, PAUL EUGENE LOUIS (1856-1922), President of France, succeeding Poincaré, the great war President, in 1920. He was educated in the College of Saint Barbe, and entered at once upon a public career. After filling minor offices he was made vice-president of the Chamber of Deputies in 1896; two years later he became its president. Deschanel has since served on commissions connected with colonial affairs and in other departments of the public service. In September, 1920, failing powers compelled him to resign the Presidency, after an incumbency of less than one year.

DESERT, *des'urt*, a region with little or no plant life. Absence of vegetation may be due either to extreme heat, as in the case of Sahara, or to lack of heat, as in the case of the tundras of Siberia. The surface of deserts is usually uneven, being broken by dunes formed by drifting sand and gravel, and bluffs that have been sculptured by rivers which traversed the region in former ages. In nearly all cases the soil is fertile and only needs water to make it productive. This has been amply demonstrated by irrigation in deserts in the United States and other parts of the world. Deserts are due to three causes: to warm winds which dry the earth but bring no rain; to distance from the sea, in which case the clouds discharge before reaching the dry area; to mountains which intercept the rain-bearing clouds.

Deserts are found in all the continents.

the most extensive areas occurring in Asia, Africa and Australia. The Sahara, the most widely known, extends across Africa from east to west (see *Typical Scenes and an oasis*, in article *EGYPT*, this volume). Continuing eastward is the Arabian Desert and the great Desert of Gobi in Asia. The Kalahari Desert occupies a large region in South Africa between the Zambesi and the Orange and Limpopo rivers. In the central part of Australia is also a large desert region. Another occurs in the northern part of Chile in South America. In the United States there is a chain of similar arid regions lying between the Rocky and Sierra Nevada mountains and extending from Mexico into Canada.

DES MOINES, IOWA, the capital and largest city of the state and the county seat of Polk County, is slightly south of the geographical center of the state, 170 miles west of the Mississippi River. Eight railroads meet at Des Moines: the Chicago, Rock Island & Pacific, the Chicago & Northwestern, the Chicago Great Western, the Chicago, Milwaukee, St. Paul & Pacific, the Chicago, Burlington & Quincy, the Minneapolis & St. Louis, the Wabash, and the Fort Dodge, Des Moines & Southern. Airway service is provided at the Municipal airport. Motor truck and bus lines connect with other cities.

The State Capitol stands on a hill in the east part of the city, surrounded by a park of 85 acres, beautifully landscaped and containing several wonderful monuments. Adjoining it is the state historical building, containing historical relics and a museum. Des Moines' Civic Center is one of the show places of the nation. It is situated in a landscaped park along the Des Moines River. On one side are the city hall, the Municipal Court building and the Federal Court building. On the opposite side of the river are the post office, the Des Moines public library and the Coliseum, a hall, seating 10,000 people.

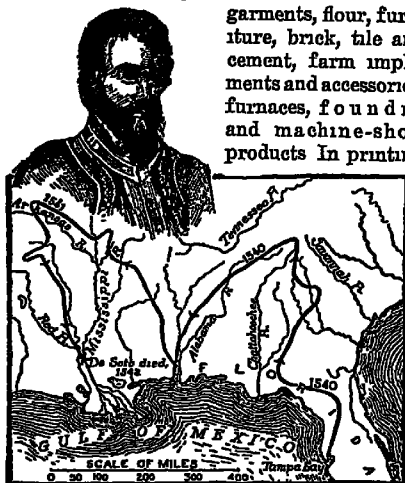
Des Moines is the home of Drake University, maintaining departments of arts and sciences, law, education, commerce and fine arts, and of the Des Moines State College of Osteopathy.

The city is governed by a system of municipal administration known as the "Des Moines Plan," which is a modified form of the commission plan (see *COMMISSION FORM OF GOVERNMENT*). All the city affairs are handled by a council of five men, each of whom is in charge of a special department.

The initiative and referendum are embodied in the Des Moines Plan.

Des Moines is a leader in the United States in the distribution of farm implements, and is the great wholesale center for the state. The important manufactures include meat packing, proprietary medicines and cosmetics,

garments, flour, furniture, brick, tile and cement, farm implements and accessories, furnaces, foundry and machine-shop products in printing



FERNANDO DE SOTO AND MAP OF HIS JOURNEYING

and publishing—especially of agricultural periodicals—Des Moines leads the nation. It also contains the home offices of several large insurance companies.

The history of the city dates from the establishment of Fort Des Moines in 1843, to protect the rights of the Sacs and Foxes. White settlers came and in 1846 the town of Fort Des Moines was laid out. A new charter was adopted in 1852, and the prefix *Fort* dropped from the name of the city. On Feb. 16, 1857, the state capitol was moved from Iowa City to Des Moines, to secure a more central location. Population 1930, 142,559.

DES MOINES RIVER, an important river in Iowa, formed by the meeting of two streams in Humboldt County. It flows south-southeast through Iowa, through a rich agricultural region, to a point about four miles below Keokuk, and then empties into the Mississippi River. The affluents are the Racoon, North, Middle, South and Boone rivers. Its length is estimated at 500 miles, and it drains an area of over 14,000 square miles. Des Moines, Fort Dodge and Ottumwa are the principal cities on its banks.

DE SOTO, FERNANDO (c. 1496-1542), a Spanish explorer and adventurer in America, whose exploits and tragic end make a thrilling chapter to the story of early American history. In 1514 he accompanied Pedrarias de Avila, his patron, to the Isthmus of Darien, where he gave evidence of a daring and independent spirit. With Cordoba he made an expedition to conquer Nicaragua, and for several years he was engaged in exploring Central American regions, seeking for a supposed water communication between the Atlantic and the Pacific.

In 1532 he was in Pizarro's expedition for the conquest of Peru, and used all his influence to prevent the murder of the Peruvian Inca. Returning to Spain in 1536 with a fortune, he married the daughter of his former patron, Pedrarias. He was soon after appointed Governor of Cuba and Florida by Charles V. Florida had not been thoroughly explored. In May, 1539, De Soto sailed from Havana with 600 men, landed at Tampa Bay, and started inland on an exploring expedition. (See portrait and map of journeys, page 1063.)

The small army moved north to the Carolinas, thence westward through Alabama to the Mississippi, following a tortuous route through the wild country. Their harsh treatment of the Indians resulted in constant warfare, in which more than 200 of De Soto's men perished. De Soto himself, worn out and discouraged, succumbed to a fever on the banks of the Mississippi in June, 1542. His body was secretly sunk in the river, and the remnants of the expedition finally, after many further privations, succeeded in floating down the river to the Gulf of Mexico and reaching a Spanish settlement at Panuco.



DETROIT, MICH., the county seat of Wayne county, the largest city of the state and fourth among the cities of the United States, is situated on the narrow, straitlike Detroit River, in the southeastern part of the state. It is eighty-eight miles southeast of Lansing, sixty-two miles northeast of Toledo, Ohio, and 287 miles northeast

of Chicago. Because of its situation Detroit is called the *City of the Straits* and the

Dardanelles of America. Within recent years it advanced to the position of first city in the world in the manufacture of automobiles; this city produces over 65% of the entire product for the United States. Detroit has excellent railroad facilities, being served by the Grand Trunk; the Michigan Central, the New York Central; the Wabash; the Detroit, Toledo & Ironton, the Pere Marquette; the Pennsylvania; the Detroit and Toledo Shore Line, and the Canadian Pacific. It has steamship connection with all important ports on the Great Lakes. In addition to the ferries, the Ambassador Bridge and the Detroit and Canada tunnel afford transportation facilities between Detroit and Windsor and Walkerville, Ont. Numerous truck and bus lines radiate from the city in all directions. Air transportation has been highly developed. There are four large airports beside the Selfridge Field, headquarters of an United States Army Air Corps.

General Description. Detroit extends along the river for eleven miles, and is built on ground sloping gently from the bank. It has an area of over 137 square miles. The city is regularly laid out, one set of streets running parallel with the river, and another set crossing them at right angles. In the central and older portions of the city, however, the streets radiate from a semi-circular plot known as the Grand Circus Park, and from a second central point called Campus Martius, and near these the blocks are somewhat irregular, a number of them being triangular.

Detroit has over forty-five parks. The most noted is Belle Isle, which includes the entire island of this name in the Detroit River, and has an area of 704 acres. It is laid out with beautiful walks, drives, flower gardens and lagoons, and contains a comprehensive zoological collection, including a fine aquarium. It also has a commodious and admirably planned bathing beach. The island is connected with the city by a magnificent bridge, which cost \$3,500,000. Grand Circus, from its location, is an important park, though it contains only about six acres. Situated as it is in the center of the business district, it affords excellent opportunity for rest. It is divided into two equal parts by Woodward Avenue. River Rouge Park is the largest, having 1,200 acres. Palmer, Clark, Owen and Cass parks and the water works grounds are also worthy of mention.

Besides these there are numerous interesting and beautiful places along the river, which during the summer are reached by excursion steamers that ply regularly between them and the city.

Buildings. The most important buildings include the General Motors building, one of the largest office buildings in the world, the \$4,500,000 Federal building, the county courthouse, the city hall, facing the Campus Martius; the Board of Commerce, the Dime Savings Bank, Ford, Penobscot, First National, Buhl, Stroh, Washington Boulevard, Book, Real Estate Exchange, David Whitney, Kresge and Majestic office buildings; the Detroit Athletic Club House; the Masonic Temple, the largest and finest in all Freemasonry; the Y. M. C. A., and the Book-Cadillac, Wolverine, Statler and Tuller hotels. Another noteworthy building is the Michigan Central station, built at a cost of \$2,000,000. Facing the city hall is the Soldiers' and Sailors' Monument, consisting of a granite shaft, 55 feet high, surmounted by a colossal bronze statue representing Michigan. Among the churches worthy of mention are the Saint Paul's Episcopal Cathedral, Saint Hedwig's, Saint Leo's and Saint Joseph's Roman Catholic churches, the Central Methodist, the First and Fort Street Presbyterian, the Woodward Avenue Baptist, the First Congregational and the Jewish Temple Beth-El.

Institutions. Among the educational and charitable institutions worthy of mention are the public library, with eighteen branches, the Museum of Art, University of Detroit, (Jesuit), Wayne University, Michigan College of Medicine and Surgery, Detroit College of Law and Detroit Institute of Technology. There are homes for the destitute and other unfortunates, a splendidly equipped house of correction and several hospitals, including the Ford, Receiving, Red Cross, Saint Mary's, Herman Kiefer and the United States Marine.

Commerce and Manufactures. The river front is lined for miles with wharves, elevators and warehouses, and there has been built here the largest dry-dock on the Great Lakes. The river forms a deep and commodious harbor, admitting vessels of the largest size, and it is one of the busiest waterways in the world. The channel is guarded by Fort Wayne, for cargoes of priceless value, enormous shipments of grain

and ore, pass through the strait. To care more easily for the extensive traffic in freight and passengers, the Michigan Central Railroad constructed a tunnel under the river connecting the Michigan and Ontario sides. The city ranks first among the ports on the northern border of the country in amount of foreign trade.

Detroit is known the world over as the motor city. Its principal industries, other than the manufacture of automobiles, includes foundry and machine shop products, bread and bakery products, machine tool accessories, non-ferrous metal alloys, paints and varnishes. The largest tire factory and the largest pharmaceutical manufacturer in the world are located in Detroit. Since 1929, with the establishment of the Great Lakes Steel Corporation in the Detroit area, this city has rapidly developed as a steel center, in the manufacture of sheet steel, billets, bars and also steel products such as beer barrels, stampings of all kinds and even steel houses. Detroit has also become a center for the manufacture of refrigerators, air conditioning equipment and oil burners.

History. The first settlement was made by the French under Cadillac in 1701, and was a fortified trading post. In 1763, at the close of the French and Indian Wars, the place was besieged by the Indians under Pontiac for several months, but was saved by the heroism of its defenders. During the Revolutionary War it was the headquarters for the British forces in the Northwest and the point from which numerous expeditions were sent out against the American settlers on the frontier. It was captured by the British in the War of 1812, but was regained by the Americans the following year. The city was incorporated in 1824 and was for a time the capital of Michigan Territory and of the state. It was supplanted by Lansing in 1847. The city celebrated the 200th anniversary of its settlement in 1901. Population, 1910, 465,766, in 1920, 993,739, and in 1930, 1,568,662.

DETROIT RIVER, a river extending from Lake Saint Clair to Lake Erie, which, though only twenty-eight miles in length, is one of the most important waterways in the world. Large grain shipments from the Northwest and vast quantities of iron ore from the Lake Superior region pass through the Detroit River. It is from a half mile to three miles in width, and so is appropriately

named, for *detroit* is French for *strait*. The river is studded with islands, and its scenery is very beautiful.

DEUCALION, *du ka'le on*, in classic mythology, the son of Prometheus. When, on account of the wickedness of mankind, Jupiter decided to destroy the world, Deucalion and Pyrrha, his wife, were spared because they had always been virtuous servants of the gods. When, after the deluge had subsided, Deucalion and Pyrrha came down from Mount Parnassus, they found the earth depopulated, and on seeking of the oracle at Delphi information as to how they could re-people the earth, they received the response that they were to throw behind them the bones of their mother. As this, literally translated, would have been to them a sacrilege, abhorrent to the gods, Deucalion and Pyrrha decided that the oracle referred to their mother earth. Accordingly they threw over their shoulders stones, which on striking the earth became human beings.

DEUTERONOMY, *du ter on'o mi*, the fifth book of the Bible and the last of the Pentateuch. It contains the last injunctions of Moses and an account of his death, and is practically a review of the law which was given to the Israelites on Sinai, with the additions that had been made from time to time until just before the death of Moses. The book consists of three orations, each of which deals with a specific phase of the law, and closes with an account of the death of Moses. It is notable for the beauty of its language and the comprehensive view of the Jewish law which it contains. It is supposed that a portion of this book was the book discovered during the reign of Josiah, and because of this it was known thereafter as the *Book of the Law*. A thorough understanding of it involves the reading of *Exodus*, *Leviticus* and *Numbers*.

DE VALERA, **EAMON DE** (1882-), an Irish statesman and administrator, native of New York City. His parents took him to Ireland in his childhood, and there he was educated. At the age of thirty he allied himself with the enemies of Great Britain, politically. After an abortive rebellion in 1916 leader De Valera was sentenced to death, but the penalty was changed to life imprisonment; he was released in 1917 under a general amnesty. In the same year he was named as President of a proposed Irish republic, was again imprisoned, but he escaped and

made his way to the United States, where he remained two years. Again placed at the head of the dissenters, he resigned soon, that he and more than forty followers could be elected to the Parliament of the Free State (recently established by British approval), with the hope of controlling it. The group refused to take the oath of loyalty to the king. In 1932 the De Valera party elected him President of the Council, the highest post in the Free State, defeating President Cosgrave. De Valera did not abandon hope of an ultimate republic for Ireland.

DEVIL, also called **SATAN**, an evil spirit, specifically, the evil one, represented in Scripture as the traducer and the father of lies. Most of the old religions of the East acknowledge a host of devils. In the doctrine of Zoroaster is an evil principle called Ahriman, opposed to the good principle and served by several orders of inferior spirits. The Mohammedan Eblis, or the devil, was an archangel whom God employed to destroy a pre-Adamite race of *janns*, or gnomes, and who was so filled with pride at his victory that he refused to obey God. The Satan of the New Testament is also a rebel against God. He uses his intellect to entangle men in sin and to obtain power over them.

The Scriptural idea of the Devil has become blended with the superstitions of various countries and with the mythology of the pagans. Ignorant hermits, unable to account for natural appearances, frequently have imagined Satan visibly present, and innumerable stories have been told of his attributes of horns, tail, and cloven feet.

DEVIL WORSHIP, the worship paid to a malignant deity believed in by many of the primitive tribes of Asia, Africa and America, under the assumption that this evil spirit will injure man unless bribed and propitiated. There is a sect called devil-worshippers inhabiting Turkish and Russian Armenia and the valley of the Tigris, who pay respect to the Devil, to Christ and to Allah, or the supreme being, and also worship the sun.

DEVONIAN PERIOD, a division of time in the history of the earth in what is known as the Paleozoic Era. It followed the Silurian period and was in turn followed by the Carboniferous. During this period that part of the globe's surface now known as North America was occupied by water and two land masses, the Appalachian and the

Continental. The first of these land masses extended as far south as Georgia and as far west as Blue Ridge Mountains, while the eastern boundary was probably farther east than the Atlantic shore line. The Continental mass extended westward from Hudson River, the shore line forming a great bay which covered the territory now occupied by western New York, Michigan and a part of Ontario. There were detached portions of land also in Colorado, in the region of the Black Hills, South Dakota, and in the central part of Texas. A long, narrow strip bordered what is now the great basin of Nevada and Utah. In the Old World most of Russia and Siberia were under water.

The animal life included crustaceans similar to the horseshoe crab and lobster crinoids, starfishes and various forms of mollusks; but the most characteristic life of the period was that of the fishes, which then reached their highest development. This period has been by some geologists named the *Age of Fishes*. See DEVONIAN SYSTEM; CARBONIFEROUS PERIOD.

DEVONIAN SYSTEM, in geology, a division intermediate between the Silurian and Carboniferous strata. It is characterized by sandstones of different colors, calcareous slates and limestones. All these contain fossils, including corals, crinoids, crustaceans, mollusca, cephalopods and fishes, the last predominating, having at this time reached their greatest development. Devonian rocks occupy a large area in central Europe as well as in the United States, eastern Canada and Nova Scotia. See CARBONIFEROUS PERIOD.

DEVONSHIRE, *dev' on sheer*, VICTOR CHRISTIAN WILLIAM CAVENDISH, Ninth Duke of (1868-), a British statesman, the successor of the Duke of Connaught as Governor-General of Canada. He received a typical English education at Eton and Cambridge, entered the House of Commons as a Liberal-Unionist in 1891, and held his seat until 1908, when, having succeeded to the dukedom, he entered the House of Lords. He was a close friend of the royal family, holding the position of treasurer of the royal household under Queen Victoria and Edward VII. In 1903-1905 the duke served as financial secretary to the Treasury; in 1912 he was made a Privy Councillor, and in 1915 became civil lord of the Admiralty.

He was Governor-General of Canada from 1916 to 1921, and in 1918 he visited

the United States for the purpose of strengthening the bonds of friendship between the two allied nations in the World War. The duke became known as one of the largest land-owners in England; his estates at one time covered 190,000 acres. These included both forest and mineral lands. He was a man of very attractive personality, a patron of art, literature and science, and a zealous sportsman.

DEW, moisture from the atmosphere that gathers on cool bodies, particularly at night. During the day the earth both absorbs and gives off heat, but after sunset its supply of warmth is cut off, while it still continues to radiate heat into the surrounding space. Grass, flowers and foliage, being good radiators, lose after sunset the heat which has previously been absorbed by them, without receiving any in return, and their temperature consequently falls considerably below that of the atmosphere. This lower temperature causes the condensation of the vapor in the atmosphere surrounding them, and it is deposited upon their surfaces in the form of dew, or of hoarfrost, where the temperature of the atmosphere is below 32°.

When the sky is clouded, the heat abstracted from the earth's surface by radiation is restored by the clouds, which, being good radiators, send back an amount of heat equal to what they receive; and a balance of temperature being thus maintained between the earth and the surrounding atmosphere, no dew is formed. The formation of dew is likewise prevented by wind, which carries away the particles of air before the vapor contained in them has been condensed. Horizontal surfaces and those which are exposed to a wide expanse of sky receive a greater supply of dew than sheltered or oblique surfaces, where circumstances diminish the amount of radiation.

The heavy dews which fall in tropical regions are in the highest degree beneficial to vegetation, which, but for this supply of moisture, would, in countries where scarcely any rain falls for months, be soon scorched and withered. But after the high temperature of the day, the ground radiates under these clear skies with great rapidity, the surface is quickly cooled, and the water vapor, which from the great daily evaporation, exists in large quantities in the atmosphere, is deposited abundantly. This deposition is more plentiful, also, on plants, from

their greater radiating power; while on hard, bare ground and stones, where it is less needed, it is comparatively trifling. In cold climates the earth, being cold and sufficiently moist, requires little dew; accordingly, the clouds, which are common in damp and chilly regions, prevent the radiation of heat, and the deposition of dew is slight. See FROST.

DEWEY, GEORGE (1837-1917), an American admiral, conqueror of Spain in the Philippines in 1898 by the successful Battle of Manila Bay. Here he exemplified the preparedness and instant readiness of the United States navy for action in his famous order, "You may fire when ready, Gridley." Dewey was born in Montpelier, Vt., Dec. 26, 1837. He was graduated from the United States Naval Academy in 1858 and entered the service of the United States aboard the frigate *Wabash*. In 1861 he was commissioned lieutenant and assigned to the steam sloop *Mississippi*, under Farragut. He took part in forcing the defenses of New Orleans and later lost his vessel by running her aground in a fog. In 1870 he was put in command of the *Narragansett* and made surveys on the Pacific coast for six years, and some years later he was put in command of the *Juniata*, on the Atlantic station.



GEORGE DEWEY

Dewey next commanded the *Dolphin*, and later still the *Pensacola*, and in 1896 he was promoted to the rank of commodore. When war broke out with Spain, he was placed in command of the Asiatic squadron, and he won the Battle of Manila Bay, May 1, 1898, without the loss of a man from his fleet. For this he was made a rear admiral and was given the thanks of Congress. The next year he was created *admiral of the navy* by special act of Congress, the first to hold that highest rank, for former holders of admiral rank were only admirals. He returned to the United States in September and received an unprecedented popular welcome. A grateful nation through popular subscription presented him with a home in Washington. He was president of the naval board until a short time before his death.

DEWEY, JOHN (1859-), an American educator and psychologist, born at Burlington, Vermont. He was educated in the University of Vermont and filled successively the positions of professor of psychology in the University of Minnesota and the University of Michigan and professor of philosophy in the University of Chicago. He organized the laboratory, or practice, department of the School of Education at the last-named institution, and it is called for him the Dewey School. In 1904 he was chosen head of the department of philosophy in Columbia University. Professor Dewey has become widely known through his writings and lectures. The best known of his publications are *Psychology*; *The Critical Theory of Ethics*; *Study of Ethics*; *Psychology of Number, School and Society*; *Democracy and Education*, and *How to Think*.

DEWEY, MELVILLE (1851-), an American librarian and educator, considered the leading authority on libraries in the United States. He originated the decimal system of classifying books, and was one of the prime movers in the work of university extension and in establishing traveling libraries. Dewey was born at Adams Center, N. Y., and educated at Amherst College. He early became interested in library work and was the leader in the movement to found the American Library Association. He was the founder, and for five years the editor, of the *Library Journal*. Later he was chosen librarian of Columbia University, where he established the School of Library Economy and became its director. From this position he was chosen secretary of the University of the State of New York and director of the state library. He transferred the library school to Albany, where it has since remained.

DEXTRIN, a gummy substance made from starch by the action of dilute acids, by malt extract or by heat. By the action of hot diluted acid, dextrin is finally converted into grape sugar. It is white, insipid and without smell. It is a good substitute for gum arabic for stiffening goods and in calico printing, and is used also on the backs of postage stamps.

DIABASE, a variety of crystalline, igneous rock ordinarily composed of lime-soda, feldspar and pyroxene. The feldspar usually occurs in the form of long, flat crystals, distributed radially in groups. When the

grains of pyroxene are large, a striking mottled effect is produced. Diabase sometimes contains olivine, and then is of a green color; again the pyroxene may be displaced by hornblende, and both the pyroxene and olivine by serpentine. Among the most important formations of diabase in the United States are the copper-bearing rocks of Keweenaw Peninsula, Lake Superior; the Palisades on the Hudson and the Hanging Hills near Meriden, Conn. Diabase also occurs in Scandinavia, Southern India, and elsewhere in smaller deposits. See **BASALT**; **DIKE**.

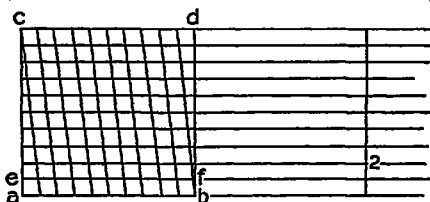
DIABETES, *di a be'tees*, a disease whose characteristic symptom is the presence of sugar in the urine. According to the latest theory on the subject, diabetes is the result of a diseased condition of the pancreas, frequently caused by overeating. The special work of this gland is the digestion of starches and sugars. When the pancreas does not function properly sugar accumulates in the blood and is carried off through the kidneys. Though diabetes is not a kidney disease, the demands made upon the kidneys irritates them, and the result is a great increase in the amount of urine passed each day. Other symptoms include intense thirst, dryness of the mouth and lips, loss of flesh and muscular weakness.

The recent discovery and preparation of a new serum, named "Insulin," credited to Dr. F. G. Banting and his associates, of the University of Toronto, bids fair to be one of the most helpful remedies ever found. Dr. Banting was awarded the Nobel prize for the discovery of this serum. It is said to act to reduce the sugar in the blood of the patient by oxidation, which the diseased pancreas fails to do. Before it was placed in the hands of the medical profession for use, the discoverers continued their study of insulin, to determine the correct manner of use.

DIACRITICAL, *di a kri't' kal*, **MARKS**. See **ORTHOGRAPHY**, subhead *Diacritical Marks*.

DIAGONAL SCALE, a scale which consists of a system of lines by means of which fractional parts of a unit of measurement may be determined. The scale is used in surveying and in map making. The accompanying illustration explains the use of the scale. The line from *a* to *b* represents one inch, that from *a* to *c* one inch. The square inch represented is divided by parallel lines into equal spaces, each representing one-

hundredth part of a square inch. At the point where the line *bd* intersects the line *ef*



DIAGONAL SCALE

may be measured one-hundredth part of a lineal inch. The two-hundredth part of a lineal inch is shown on the first horizontal line above *ef*.

DIALECT, forms of a language differing in grammar, vocabulary or pronunciation from the language as it has been adopted in literature and in intercourse among well-educated people. Although the use of provincial dialects becomes inconvenient after a language has acquired a fixed literary standard, the study of such dialects is always valuable to the philologist for the light it throws on the history of the language. Dialects at one time differed so in England that inhabitants of one county could scarcely understand those of an adjoining one, and there are many sections in which an American finds it difficult to understand what is being said. Dialect is employed frequently in fiction, the Scotch dialect stories of Scott, Ian Maclaren and Barrie form an important body of literature. French Creole, Yankee, Hoosier and negro dialects are characteristic American forms.

DIAMOND, the hardest and one of the most valuable of gems, the purest form in which the element carbon is found. It crystallizes in forms belonging to the regular or cubic system, the most common being the regular octahedron and the rhombic dodecahedron (twelve faces). The finest diamonds are colorless, perfectly clear and transparent. Such are said to be of the first *water*. Some diamonds are blue, pink, green or yellow, and such are highly prized, if of a distinct and uniform tint throughout. The diamond is so very hard that nothing will scratch it; it is, in fact, the hardest substance known.

Diamond Cutting. The value of a diamond is much enhanced by the cutting of facets, or flat surfaces, upon it, inclined at certain angles to one another so as to produce the greatest possible play of light and color.

What is called the *brilliant* cut best brings out the beauty of a good stone—a central octagonal facet surrounded by many smaller facets. In what is called the rose cut, six triangular surfaces meet in the center.

The art of cutting and polishing the diamond was unknown in Europe till the fifteenth century, and the stone itself was not nearly so highly valued in the Middle Ages as the ruby. The uncut diamond looks like a piece of quartz. It is of a dull white color, and is full of rough seams. In this condition it is set into a matrix of wax, which is fastened to the end of a stick. In another matrix a cheap diamond is set, and a workman grinds the two stones together, until the one to be cut has assumed the general contour of the final cut. The dust and chips which come off are carefully collected and used afterward in polishing work. The rough stone is then firmly fixed in a stronger matrix made of zinc and lead. An iron disk turning at the rate of 2,000 revolutions a minute does the cutting. Upon the disk is sprinkled a supply of diamond dust, which sinks into the minute pores of the iron and produces the sharpest grindstone that can be made. The workman, with a magnifying glass close to his eyes, grinds first the table, or top part, of the stone. The metal matrix is then melted and the stone embedded, face downward, in another iron matrix for the grinding of the under side. After this, one by one, the facets, or bezels, are cut. If the diamond is large, the corners are also beveled.

Diamonds are valuable for many purposes. Their powder is the best for the lapidary. They are also used for jewels in watches, as lenses for microscopes, and in the cutting of window glass and plate glass. When used as a glazier's tool the diamond is not cut. Inferior kinds of diamonds are also extensively used by engineers in rock boring and by copperplate engravers as etching points.

Diamonds are obtained from alluvial deposits, such as sands and clays, from which they are separated by washing. They are found in India, Borneo and other parts of the East, and in some localities in North America and Australia; but the chief diamond fields of to-day are Brazil and Cape Colony, the center of the latter being Kimberley, in Griqualand West, where diamonds were discovered in 1867. The Kimberley mines now yield more than nine-tenths of all the diamonds produced in the world.

Historic Gems. One of the largest diamonds known (weight 367 carats) was found in Borneo about a century ago, and it now belongs to the rajah of Mattan. One of the most celebrated is the Koh-i-noor (Mountain of Light), belonging to the British crown. It weighed originally nearly 800 carats, but by subsequent recuttings it has been reduced to 103½ carats. The Orloff diamond, which for a long time was the property of the czar of Russia, weighs 195 carats; the Pitt diamond, among the French crown jewels, weighs 136½ carats. The former, which came from India, has been thought to have originally formed part of the Koh-i-noor stone. Some of the South African diamonds are also very large. In 1905 the largest diamond yet discovered was found in the Premier mine in Transvaal Colony. It weighed in the rough about 3,000 carats, and was cut into nine large stones and a number of small ones. It was known as the Cullinan diamond.

DIANA, or **ARTEMIS**, in classical mythology, the goddess of the moon and of the chase. She was the daughter of Jupiter and



DIANA

From the Painting by Correggio

Latona and the twin sister of Apollo, and was born on the island of Delos. Diana was a maiden divinity, but that she was not en-

fiery indifferent to the power of love is shown by her treatment of Endymion (which see). The strictest chastity was demanded of her worshippers, and at one time she changed Actaeon into a stag and allowed him to be torn to pieces by his dogs, because he had come upon her as she was bathing. As the goddess who presided over births, she was especially worshiped by women, and no man was allowed in her temple. In accordance with her various characters, there were differing representations of her. Most frequent are those as a huntress, with bow and arrows; as a moon goddess, with the crescent of the moon above her forehead, or as the goddess of the nymphs, in a chariot drawn by stags.

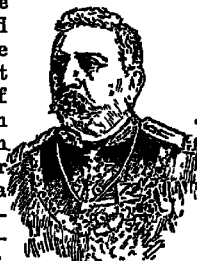
DIAPHRAGM, *dî'a fram*, in anatomy, the large muscle that separates the cavity of the chest from that of the abdomen. The aorta, esophagus, thoracic duct, inferior vena cava and some of the large nerves pass through it. In its natural situation the diaphragm is convex on the upper side and concave on its lower, but when the lungs are filled with air it becomes almost flat, pressing the contents of the abdomen downward and outward. It is the principal agent in respiration, particularly in inspiration. A complete diaphragm is found only in mammals, or animals that have milk glands. See HICCOUGH; RESPIRATION.

DIAS, *dî'as*, BARTHOLOMEW (?-1500), a celebrated Portuguese navigator. He was put in charge of an expedition to explore the west coast of Africa, and without knowing it he sailed around the southern end of the continent and found himself, to his surprise, on the east coast. The southernmost cape of the continent the Portuguese king named Cape of Good Hope (which see). On his return from a voyage to Brazil in 1500, Dias perished in a storm.

DIATOM, a microscopic plant, almost universally distributed throughout both salt and fresh water. They are found in rain troughs, in ditches, on sand at the bottom of clear brooks, on snow and even in the dust of volcanoes. Countless millions of them exist in the water, where they form a large part of the food of the lower marine animals. They exist in a great variety of beautiful forms, and have hard, prettily sculptured coverings, or shells.

DIAZ, *dî'ahz*, PORFIRIO (1830-1915), the greatest figure in Mexican history for many

years, a man sufficiently strong and wise to control the discordant elements of the republic. For a time he studied law, but at the outbreak of the war with the United States he entered the army, and from that time he devoted himself to a military career. In the factional fights which disturbed Mexico for many years he took a prominent part, identifying himself with the Liberal party and proving, during Napoleon III's



PORFIRIO DIAZ attempt to found an empire under French control, a most efficient leader of the patriots. In 1867 he marched to Puebla at the head of a Republican army and took the city by storm, and afterward he aided in the capture of the City of Mexico. In 1876 he became President, and he soon proved his exceptional ability. He was succeeded by General Gonzalez and became minister of public works, but in 1884 he was again elected President, and changes were made in the Constitution so that he might continue in office. Until 1911 the opposition to Diaz was not powerful enough to accomplish his overthrow, but in that year a revolution headed by General Madero resulted in the resignation of the President and his enforced departure from the country. He took up his residence in Paris, where he died.

DICE, *dîse*, cubical pieces of bone or ivory, marked on each of their six faces with dots, from one to six in number, and employed in gambling. In numbering the faces, the sum of the dots on opposite faces always equals 7. The dice are shaken in a small box and are then thrown on the table, when the spots showing uppermost are counted in various ways, usually like the cards in a poker hand. Dice are of very ancient origin, being well known among the Egyptians and Greeks.

DICKOISSEL, a handsome bird, rather larger than the majority of the sparrow family, to which it belongs, and common in the open regions of Central United States. Its back and body generally are dark, though there is a bright chestnut patch on the wing. Its throat is white; its lower parts are yellow, with a black crescent band across the breast. The name is an imitation of the bird's call.



DICKENS, CHARLES (1812-1870), one of the great English novelists of the Victorian Age, whose books were read in his own day more widely than those of any of his contemporaries. No other writer has ever equaled Dickens in ability to picture the life of the lower and middle classes of nineteenth-century England, and his

novels are to-day read and enjoyed by a large following.

He was born at Landport, Portsmouth, and after a time removed to Chatham, where his rather shiftless father, the Micawber of *David Copperfield*, kept the family until 1821. After this the family went to London, where they fell into poverty, and Charles was for a time a mere drudge in a blacking warehouse. A period of schooling and a clerkship in a lawyer's office followed, and then, having mastered short-



CHARLES DICKENS

hand, he became a newspaper critic and reporter. Later he was a contributor to the *Monthly Magazine* and the *Evening Chronicle*, in which were published the essays and tales known as *Sketches by Boz*. These were so successful that a new series was begun, and in *Pickwick Papers* a new class of characters, eccentric, indeed, but vital representations of the humors and oddities of life, such as Mr. Pickwick, Sam Weller and his father, Mr. Winkle and others, were made familiar to the public.

To *Bentley's Magazine* Dickens contributed *Oliver Twist*, a work which opened up that vein of satire of institutions which became a distinguishing feature of his work. As the special object of *Oliver Twist* was to expose the abuses of the workhouse system, so that of *Nicholas Nickleby* was to denounce the management of cheap boarding schools. Both did, indeed, do much toward correcting the abuses against which they were directed. *Master Humphreys's Clock*, issued in weekly numbers, contained among

other matter the *Old Curiosity Shop* and *Barnaby Rudge*, the latter an historical tale. On his return from a visit to America, Dickens wrote *American Notes for General Circulation* and *Martin Chuzzlewit*, which dealt with his American experiences, and which contained more of his characteristic humor than any of his other works, except *Pickwick Papers*.

In 1845 Dickens went to Italy, and on his return the *Daily News* was entrusted to his editorial management; but this was an occupation uncongenial to his mind, and in a few months the experiment was given up. The *Pictures from Italy* were published the same year. Next followed *Dombey and Son* and *David Copperfield*, a work which has a strong autobiographical element, and which was Dickens's favorite among his works. In 1850 Dickens became editor of the weekly serial, *Household Words*, which was converted later into *All the Year Round*. In 1853 appeared *Bleak House*, an appeal against interminable suits in chancery, and this was followed by a *Child's History of England*; *Hard Times*; *Little Dorrit*; *A Tale of Two Cities*, the second of his novels with an historical setting; *Great Expectations*, the best-rounded of his works, and *Our Mutual Friend*, the last novel which he lived to finish. *The Mystery of Edwin Drood* was left incomplete at his death. During his latter years, Dickens increased his popularity by giving readings from his own writings.

In reading any of Dickens's novels, and more especially those that contain most of his peculiar wit and humor, one is impressed with the fact that he must have been a delightful companion. His humor lies so largely in the way he looked at things, the ability to put into words the incongruities which another observer might easily miss, that one feels that a walk about London with him would have afforded more amusement than the best passages of his works; and the testimony of Dickens's friends convinces us that he was in his everyday life the genial, interested man which one might expect to find him. He was of a very sociable temperament and delighted in having his friends about him. One of his most marked characteristics was the dramatic ability mentioned above and his extreme fondness for the theater. He often took part in private theatricals, and it is said that at one time an old banner-bearer

words are made clear by explanations and illustrations.

Reference is made to other words. By looking up these the reader will find further information relating to the word in question.

The first attempt to give a complete list of the words in the English language was made by Nathan Bailey in 1721.

DICTOGRAPH, *dik'toh graf*, an instrument constructed on the same principle as the telephone, but differing from that apparatus in many respects. The transmitter placed in any part of a room will convey any conversation carried on there—even loud whispers. This instrument is often used in detective cases, being concealed in places where disclosing conversations are expected to take place. The person wishing to hear what is said listens at the other end of the wires through a receiver which greatly increases the volume of sound.

DIDO, daughter of a king of Tyre. After her father's death, his successor, Dido's brother Pygmalion, murdered her husband, Acerbas, or, as Vergil calls him, Sichaens, for his wealth. Dido, however, managed to conceal this wealth, and to escape with it to Africa, taking with her also many of the inhabitants of Tyre. Having obtained from the people of northern Africa a promise of as much land as she could cover with a bull's hide, she resorted to stratagem, cut the bull's hide into narrow strips, which she fastened together, and with this rope enclosed a large piece of land, on which was built the citadel at Carthage. Vergil tells that Aeneas in his wanderings landed at Carthage and was entertained by Dido, who fell in love with him. When he was directed by the gods to depart, Dido in despair killed herself. (See illustration, page 30.)

DIE, a tool used for stamping metal. The die is made of the finest steel, and the design which it is to stamp is engraved upon it. Dies are used in stamping tools, coins and metals. They can be used by hand, but those used for stamping coins and medals are worked by machinery. In stamping coin, two dies are used, one above and one below, so that both faces are stamped at once.

DIELECTRIC, in general, an insulator or nonconductor of electricity. The term is especially applied to a nonconductor separating two conductors. See **INSULATOR**.

DIESEL ENGINE. In the year 1895 Dr. Rudolph Diesel, a German, invented the engine which bears his name. In it air is com-

pressed in the engine cylinders to a pressure great enough to heat it above the ignition point of the fuel which is a heavy oil. Hence no spark plugs are required for igniting the fuel. The explosion that results is more of a gradual burning than a sudden detonation, which makes the Diesel a more smooth running engine than the gasoline type.

The Diesel engine, like the gasoline engine, has four cycles of operation. On the intake stroke of the piston air is drawn into the cylinder. On the compression stroke, the air is compressed to pressures upwards of 400 pounds per square inch. On the power stroke, the heated air ignites the fuel and pushes the piston outward to drive the crankshaft. On the exhaust stroke the burned gases are expelled.

Because of the greater weight necessary in the construction of the Diesel engine, its use was long restricted to stationary units. Later developments, however, have enabled engineers to decrease the weight of these engines so that railroad locomotives, motor trucks, automobiles, tractors and even airplanes have used them successfully. Diesel engines are important as prime movers in generating electricity. They are geared to generators in stationary power plants, ships, locomotives, etc.

DIE-SINKING, the art of preparing dies for stamping coins, buttons, medallions, jewelry and fittings. The steel for the manufacture of dies is carefully selected, forged at a high heat into the rough dies, softened by careful annealing and then handed over to the engraver. After the engraver has worked out the design in intaglio the die is put through the operation of hardening, after which, being cleaned and polished, it is called a *matrix*. This is not, however, generally employed in multiplying impressions, but is used for making a *punch*, or steel impression for relief. For this purpose another block of steel of the same quality is selected, and after being carefully annealed or softened, it is compressed by proper machinery upon the matrix, till it receives the impression. When this process is complete, the impression is retouched by the engraver and is hardened and collared like the matrix. Any number of dies may now be made from this punch, by impressing upon it plugs of soft steel. In place of this process, patterns are now frequently engraved upon rollers, for transference to sheet metal by pressure.

DIET, in Europe, a name given to a meeting which in America would be called a congress, conference or assembly. Diets have been held on numerous occasions to settle religious controversies; a particular instance was the Diet of Worms (1521) which ordered Luther to appear before it (see LUTHER, MARTIN). In some European countries the legislative body is known as the diet.

DIET, the food which is habitually eaten and drunk, to repair the waste of tissues and to support growth. The diet of persons varies much according to climate, work, age, sex, strength, state of health and individual taste. A man of average weight and in normal health would require for a well-balanced diet about the following amount of food a day; proteins, four ounces; fats, three ounces; sugars and starch (carbohydrates), fourteen ounces, water, four quarts.

Slight changes are necessary for a change in climate. Hard work makes necessary an increase in all articles of diet. A diet composed largely of proteids will increase flesh. A diet of easily digested food is necessary for brain workers. The diet of a child should be different from that of a person in middle life, and that of an aged person is different from either, though it may be more nearly like that of a young child, for as activity diminishes the quantity of food should be decreased. Particular diets are necessary in certain diseases, and when a person follows a prescribed course in eating he is said to be "on a diet." In tuberculosis a person must eat all that he can digest of nitrogenous foods, bread with much butter, fats, olive oil, milk, cream, meats and eggs. Skim milk is valuable in diseases of the digestive organs. See FOOD, DIGESTION.

DIFFRACTION, *dif'frak'shun*, in physics, the spreading of rays of light, so as to form a spectrum (see LIGHT, subhead *Spectrum*). If a small round hole is made in a shutter to a dark room, and the rays of light thus admitted are allowed to fall upon a screen, an image of the sun surrounded by rainbow hues is observed. If the hole is changed to a slit, a similar effect is produced. By coating a pane of glass with India ink, and then with a fine needle ruling parallel lines upon this surface, as near together as possible, a *diffraction screen* is produced, which will illustrate most of the phenomena of diffraction. Glass screens with very fine rulings are prepared by the most delicate machinery, for the

purpose of illustrating the phenomena in physical laboratories. The play of colors seen on the feathers of some birds and in mother-of-pearl is due to diffraction.

DIFFUSION, the natural mixing of two fluids, either gaseous or liquid, when brought in contact. To demonstrate, fill a glass jar with water that has been slightly colored with litmus; then with a small tube place a few drops of sulphuric acid in the bottom of the jar. Watch the color of the water change. As fast as the acid comes in contact with the litmus solution, it changes the blue to red. If the vessel is allowed to remain quiet, the line of red slowly rises, until the blue disappears entirely, showing that the acid has entirely permeated the water. The contents of the jar becomes a weak acid. Alcohol and water placed in a vessel will mix in a similar manner, but such liquids as oil and water or water and mercury will not mix. Gases diffuse in a similar manner. If two jars be placed with their mouths together, the lower filled with chlorine and the upper with hydrogen, though hydrogen is much the lighter, the contents of both jars will in a short time be the same.

DIGESTION, *dij'es'chun*, the process whereby food is prepared for absorption by the blood. Digestion begins in the mouth, where the saliva dissolves the salts and sugars taken in a solid form, and by its active principle, ptyalin, changes starch into sugar. In the stomach the salivary digestion may continue for some time, or till the presence of the free acid there stops the action of the ptyalin. The food, subjected in the stomach to a slight churning process, is mixed with the gastric juice, the active principle of which is pepsin. It digests albumens, changing them into soluble peptones. It does not affect the starches that have escaped the action of the ptyalin, the sugars or the fats. Milk is curdled by the acid of gastric juice and by a ferment called *rennin*. The average time occupied in the digestion in the stomach is from three to four hours, but this varies according to the quantity and quality of the food, muscular exertion, bodily health and the condition of one's mind.

When the *chyme*, the partly digested food, passes through the pylorus into the small intestine, the last stage of digestion begins (see *INTESTINE*). The pancreatic juice through its ferment, *trypsin*, finishes the

work of the gastric juice in converting proteids into peptones. It completes the work of the saliva in converting starch into sugar, and the bile changes the fats and oils into a soapy substance. The intestinal juices complete the work, and *chyle*, the digested food, is ready for absorption. In the large intestine there is but little digestion carried on. See ABSORPTION; CHYLE; FOOD; SALIVA.

DIGIT, *di'jit*, in arithmetic, any one of the ten numerals, which are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. It is also a measure of a finger's breadth, equal to about three-quarters of an inch. Digit in anatomy is any one of the fingers or toes. In astronomy it is a unit of measure equal to one-twelfth the diameter of the sun or moon and used in estimating the quantity of an eclipse; that is, if the eclipse obscures one-half the diameter of the planet it is an eclipse of six digits.

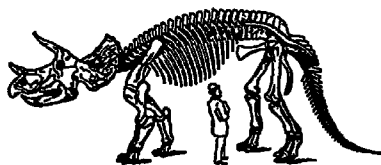
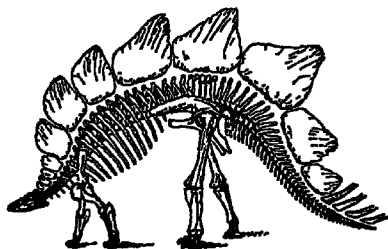
DIGITALIS, *dij'i ta'lis*. See FOXGLOVE.

DIKE, an igneous rock, which in the molten state flowed into a fissure, where it solidified. Dikes are found in all regions that have been subjected to volcanic action. They vary from a few inches to a hundred feet or more in thickness. The rock in thin dikes is usually more compact, because of the quick cooling. The surrounding rocks may be sedimentary or igneous, and usually are of a different degree of hardness. Dikes should be distinguished from veins containing ore deposits.

Artificial embankments designed to prevent overflows are also called dikes. Holland is thus protected from the North Sea, and in other places river valleys are reclaimed by this means.

DILLON, JOHN (1851-1927), an Irish politician, the chairman of the Irish Nationalist party from 1896 to 1899, and successor of John Redmond in that position after the latter's death in 1918. Dillon was elected to Parliament for Tipperary in 1880, and open expression of radical views led to his imprisonment for several years. In 1885 he was elected to Parliament for East Mayo, and was regularly reelected until 1918. During the critical period in 1918, when the Irish question became acute, he firmly opposed conscription in Ireland, but also opposed the radicals of the Sinn Fein Movement (see SINN FEIN). In the election of December, 1918, the Irish Nationalist party was practically wiped out, and Dillon lost his seat to a Sinn Feiner.

DIME, a silver coin of the United States, stamped to pass for ten cents in value. As a matter of fact, there is only about five cents' worth of silver in the dime, at the usual value of silver (see ALLOY). Dimes are legal tender (which see) for the payment of a debt not exceeding ten dollars. The word is of French and Latin derivation and



FOSSIL DINOSAURIA

means *tenth*; thus its name, applied to the tenth part of a dollar.

DIMITY, a thin cotton fabric, usually white, resembling muslin, but with ornamental stripes or figures in "self-color" woven into it.

DINGLEY BILL, a tariff measure passed in the United States Congress in 1897, notable as a high-protection measure (see PROTECTION; TARIFF). It bore the name of Nelson Dingley (1832-1899) as author, because Dingley, a Representative from Maine, was chairman of the House Ways and Means Committee and in charge of the bill while it was being compiled and passed.

DINGO, *ding'go*, the native wild dog of Australia, extremely fierce and of a wolf-like appearance. The ears are short and erect, the tail is rather bushy and the hair is of a tawny color. This is the only kind of dog in existence which is found in both a wild and domestic state. The natural cry of the dingo is a wolfish howl. When kept with the dogs the animal learns to bark. It is very destructive to sheep and small domestic animals.

DINOSAURIA, *din o saw'ri a*, large prehistoric reptiles, the remains of which are found in certain rocks. They were inter-

mediate between the ostrichlike birds and the lizards. The megalosaurus, one of the largest species, when full-grown, was forty feet long. It fed upon flesh. The *iguanodon*, about half as long, fed upon vegetable food. The *diplodocus* was of medium size. In all these species the small heads indicated the animal's slight brain development and consequent low order of intelligence. See IGUANODON.

DINWIDDIE, ROBERT (1690-1770), a colonial official in America, born in Scotland. He was governor of Virginia from 1752 to 1758, but was recalled, after precipitating the French and Indian War and, by his ill temper, avarice and incompetence, rendering himself generally unbearable to the Americans.

DIOCLETIAN, di o kle'shun, emperor of Rome, a man of low birth, who was raised to the imperial power by the army in A. D. 284. He appointed Maximian as his colleague, and chose two assistants, known as Caesars, who were to receive the succession. Under these four the Romans won numerous victories. Diocletian and Maximian resigned the power to their subordinates in 305.

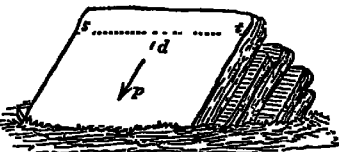
DIOGENES, di o'je nees (412-323 B. C.), a famous Athenian philosopher, the most distinguished representative of the Cynic School. He despised all philosophical speculations and exposed the follies of his contemporaries with wit and good humor. He opposed the corrupt morals of his time, and advocated the simple life. As an exemplar of Cynic virtue he ate the coarsest food, practiced the most rigid temperance, walked through the streets of Athens bearded, with feet bare, without any coat, a stick in his hand and a wallet on his shoulders, and, according to the popular story, slept in a tub. According to another story he went about the streets of Athens by daylight with a lantern in his hand looking, as he said, for an honest man. To Alexander the Great, who asked "How can I serve you, Diogenes," he made the famous reply, "By standing out of my sunshine." "If I were not Alexander, I should wish to be Diogenes," was the ruler's comment. See CYNIC SCHOOL OF PHILOSOPHY.

DIOMEDES, di o mee'deez, in Greek mythology, a king in Thrace who had a number of mares, which he fed on human flesh. All strangers who entered his territory were thrown to these animals to be

devoured, until Hercules, overcoming Diomedes, fed him to the horses, which he afterward carried off. A second Diomedes was one of the heroes at the siege of Troy, chiefly noted for having helped Ulysses carry off the Palladium.

DIONYSIUS, di o nish'i us, THE ELDER (431 ?-367 B. C.), tyrant or absolute ruler of ancient Syracuse, a man of obscure parentage. He served in the army, obtained the rank of general and afterward of commander in chief and, gaining the support of the army, seized the supreme power in Syracuse when he was but twenty-five years of age. He extended his rule over other cities in Sicily, and also gained a complete victory over the Carthaginians living on the island. As a patron of art and learning he made Syracuse a brilliant center of Grecian civilization. Dionysius the Younger, his son, figures in the story of Damon and Pythias (which see).

DIP, in geology, the name given to the angle of slope of inclined rock strata, as *dip* in the diagram. The dip is measured in degrees and is determined by a simple instrument called the clinometer, a square slab of wood having on one of its broad flat surfaces a graduated arc, across which hangs a plummet, attached to one corner. When the block is placed against the rock in such a way that the surface on which



DIP

the arc is drawn stands at right angles with the rock, and so that the plummet suspended from the highest corner of the block swings across the face of the arc, the angle of the dip is determined. The horizontal direction at right angles to the line of dip is called the *strike*, shown by *st* in the diagram.

DIPHTHERIA, dif the're ah, or dip the're ah, an infectious and exceedingly dangerous disease, which usually attacks the young in preference to the old. It is caused by a bacillus which has been identified, and the mode of infection is well understood (see GERM THEORY OF DISEASE).

In diphtheria the throat is inflamed, and a false membrane forms. This appears first in patches on the mucous membrane of the tonsils, and it then extends to the larynx and up

into the nasal passages and the mouth. If it goes down into the windpipe it may cause suffocation by closing the tube to air. Diphtheria causes great weakness and nervousness and is frequently accompanied by other diseases, and paralysis may follow at any time within a few weeks after the attack. Within recent years serious epidemics have been prevented by the isolation of patients, and the severity of attacks has been lessened wonderfully by early inoculation with an antitoxin prepared for that especial purpose (see *SERUM THERAPY*). If the antitoxin is administered in time, it is almost as certain a specific as vaccination is for smallpox. Therefore parents should lose no time in consulting a physician as soon as their children show a diseased condition of the throat, or a tendency towards it.

Because of the highly-contagious character of this disease, very strict precautions should be taken during the course of an attack. Not only should the patient be kept isolated, but the bedding and everything else in the sick room should be thoroughly disinfected. After recovery the house must be completely fumigated. In case of suspected exposure, those liable to contract the disease should be inoculated.

DIPHTHONG, *di'f'thong*, or *dip'thong*, a coalition or union of two vowels in one syllable. In uttering a proper diphthong both vowels are pronounced, but the two sounds are so blended as to form one syllable, as in *void*, *bough*. The term *improper diphthong* is applied to the union in one syllable of two or more vowels, of which only one is sounded, as in *bean*.

DIPLOMACY, the science or art of conducting political negotiations between nations; the branch of knowledge which deals with the relations of independent States to one another; the agency or management of envoys accredited to a foreign court; the forms of international negotiations. Cardinal Richelieu is generally considered as the founder of that regular and uninterrupted intercourse between governments which exists at present among all the great nations of the world.

Diplomatic agents are of several degrees: 1, ambassadors; 2, envoys extraordinary and ministers plenipotentiary; 3, ministers resident; 4, *charges d'affaires*. Besides these, each legation has its secretary and military and naval *attaches*. The four grades of repre-

sentatives in the diplomatic service are discussed under their titles in these volumes.

Related Articles. Consult the following titles for additional information.
Ambassador Envoy Extraordinary
Charge d' Affaires Minister Resident

DIPPER, or **WATER OUZEL**, a remarkable little singing bird, closely related to the thrushes, but resembling the wrens in appearance, especially in its up-tilted tail. It is covered with very close, water-proof plumage and lives about streams, often in the vicinity of waterfalls, into which it dashes in a perfectly fearless manner. At times it goes entirely through a cascade and finds in the crevices of the rocks back of the water, dry places where it can build its dome-shaped nests and rear its young. The dipper is a rather dark bird with a white breast, and as it moves about it jerks its tail upward and bobs its head downward. There are several species of dippers found in Asia, northern Europe and the high regions in the western parts of the United States and Canada.

DIP'TERA. See **INSECTS**

DIRECTORY, the executive body of five men appointed to direct the government of France in 1795. According to the constitution, one member of the Directory was to retire each year to make way for a new member. Its dealings with internal affairs made the body unpopular, and its military policy led to its complete overthrow by Napoleon in 1799. It was succeeded by the Consulate. See **NAPOLEON I.**

DIRIGIBLE BALLOON, a type of lighter-than-air craft, in form a large cigar-shaped balloon equipped with power plants and propellers for movement and control vanes for steering.

The first successful attempt to apply power to a free balloon was accomplished in 1852 when Henri Giffard built in Paris a cylindrical bag containing 80,000 cubic feet of gas and suspended from it a three horse power steam engine equipped with a propeller. This "dirigible" had a speed of four miles an hour in still air and was maneuvered by means of a rudder. With the development of the internal combustion gasoline engine late in nineteenth century a power source having the necessary lightness was available. Using crude gasoline engines, Alberto Santos Dumont about the beginning of the twentieth century constructed several airships in which he made trips in the vicinity of Paris.

The Zeppelin Airship. At about the same period, Count Ferdinand von Zeppelin began the experiments that have made his name synonymous with airships and which brought leadership in that field to Germany, a distinction still held by that country. In 1900 Zeppelin laid the foundation of present airship design by launching a rigid hull consisting of fabric stretched over an aluminum frame-work and which derived its buoyancy from a number of independent gas containers in the interior, a type structurally much safer than the non-rigid single-chamber balloon which deflates if punctured in any part. By 1914 Zeppelin had built 26 airships, some of them of nearly 1,000,000 cubic feet capacity, powered with engines that gave speeds of up to 50 miles per hour, and capable of carrying several dozen passengers.

In 1919 the British *R-34* successfully crossed the Atlantic to the United States and returned to England, and in 1924 the *Los Angeles*, crossed the Atlantic in 70 hours. In 1928 Germany launched the *Graf Zeppelin*, which completed a round trip to the United States, then a trip around the world, and was subsequently put in mail and passenger service between Germany and Brazil. By 1935 this airship had made over 100 ocean crossings.

Although a number of rigid and semi-rigid airships of small size are used in commercial and military operations in the United States, this country has not had a fortunate history in the larger airships, in spite of the fact that non-explosive helium is used instead of dangerous hydrogen. Following the disaster to the *Shenandoah* in 1925, the U S S *Akron* was launched in 1931. This was the world's largest airship, having a capacity of 6,500,000 cubic feet. It was driven by eight engines that developed 4,480 horse power and had a speed of about 85 miles per hour. The *Akron* was lost at sea during a storm in 1933, together with 73 officers and men. A sister airship, U S S *Macon*, launched in 1933, fell into the sea off California in 1935 and sank with two of her crew. See AIRPLANE; BALLOON, FLYING, STORY OF; HELIUM, SANTOS-DUMONT, ALBERTO, ZEPPELIN, FERDINAND.

DISCIPLES OF CHRIST, or CHRISTIANS, a Protestant denomination representing the fruit of the labors of Thomas Campbell and his son Alexander (see CAMPBELL, ALEXANDER). In 1812 the two Campbells,

who were living in Virginia, left the Presbyterian Church and began to work for a simpler form of organization and worship. At first they associated themselves with the Baptists, but later their followers separated into distinct bodies, and the movement took definite form about 1830, when Alexander Campbell began the publication of the *Millennial Harbinger*, in which he set forth the principles of his faith.

The Disciples of Christ accept the Bible as the only revelation of Divine will, and they have no authoritative creed. So far as possible they pattern their forms of worship after those of the apostolic church, and they practice baptism by immersion and the weekly observance of the Lord's Supper.

DISCOUNT, a reduction from a stated sum or price. In trade a discount is allowed from list prices because values have fluctuated, or for payment of an account before it is due; such deduction or allowance is called *trade discount*. If a bank buys a note of you or if you borrow money from it, the bank takes its interest in advance and gives you the *proceeds*. You may request a loan of \$100, for four months, at 6 per cent. The interest is \$2; the bank gives you \$98 as proceeds, and takes your note for \$100, without interest, if paid when due. This discount is called *bank discount*.

Another method of discount, called *true discount*, is no longer employed.

DISCUS, THROWING THE, an athletic exercise which was in high favor among the ancient Greeks, and which is still popular among athletes. The ancient discus was a round plate of stone or metal, twelve inches in diameter and of four pounds seven ounces weight. The modern discus is made of wood and is bound on the edge with a steel band. It is eight inches in diameter and two inches thick at the center, and weighs four and a half pounds.

The discus thrower stands in a seven-foot circle, holds the discus flat against the palm of his hand and after a preliminary swing of his body hurls it without leaving the circle in which he stands. The trained athlete easily throws 160 feet. Discus throwing demands less muscular strain than shot-putting and throwing the heavy weight, proficiency depending on skill rather than on great strength.

DISEASE, *dis eez'*, ill health not caused by old age. Diseases are frequently classi-

fied as *functional* and *organic*. In the former the organs are sound, but from some cause do not work properly; in the latter, the tissues of the organs are not healthy. Measles and scarlet fever are examples of functional diseases; cancer of the stomach and Bright's disease are organic. Sometimes both forms are present together. The most important diseases arise from the presence in the organs of bacteria and of poisonous products formed by foreign substances.

Related Articles. Consult the following titles for additional information.

Abscess	Erysipelas	Neurasthenia
Adenoids	Fainting	Neuritis
Anaemia	Fever	Neurosis
Angina Pec-	Frostbite	Neurotic
toris	Gangrene	Nightmare
Aphasia	Gastritis	Palpitation
Apoplexy	Goiter	of the Heart
Appendicitis	Gout	Paralysis
Asphyxiation	Hay Fever	Pellagra
Asthma	Headache	Peritonitis
Astigmatism	Hernia	Plague
Atrophy	Hiccough	Pleurisy
Bacteria and	Hives	Pneumonia
Bacteriol-	Hookworm	Putrefaction
ogy	Hydrophobia	Quinsy
Baldness	Hysteria	Rheumatism
Blindness	Immunity	Rickets
Boil	Infantile	Ringworm
Bright's Dis-	Paralysis	Saint Vitus's
ease	Infant Mor-	Dance
Bronchitis	talidity	Scarlet Fever
Bunion	Influenza	Scrofula
Burns and	Insanity	Scurvy
Scalds	Insomnia	Seickness
Cancer	Itch	Sleeping Sick-
Canker	Jaundice	ness
Catalepsy	Kleptomania	Smallpox
Cataract	Laryngitis	Spasm
Chicken-Pox	Lead Poison-	Squinting
Chilblain	ing	Sunstroke
Cholera	Leprosy	Tic Doulou-
Colic	Lockjaw	reux
Corns	Locomotor	Tonsillitis
Cough	Ataxia	Trichiniasis
Croup	Lumbago	Tuberculosis
Dandruff	Lunacy	Tumor
Delirium	Lupus	Typhoid Fev-
Delirium	Malaria	er
Tremens	Measles	Typhus Fever
Diabetes	Medicine	Vari-cose
Diphtheria	(with list)	Veins
Dropsy	Meningitis	Vertigo
Dyspepsia	Monomania	Vomiting
Ecze-ma	Mumps	Whooping
Elephanti-	Myopia	Cough
asis	Nausea	Wounds
Epidemic	Nephritis	Yellow Fever
Epilepsy	Neuralgia	

DISEASE, GERM THEORY OF. See GERM THEORY OF DISEASE.

DISEASES OF PLANTS. A knowledge of plant diseases is of the greatest importance to the farmer. It is estimated that losses amounting to millions of dollars result every year from certain plant diseases. They are generally due to one of the following four causes: fungi, bacteria, insects or physiological causes.

There are fungi which live wholly within the tissues of the plant, those that throw their spores in the air and those that live in the open air, fastening their rootlets to the

plant and penetrating openings in the epidermis. When once the plant is attacked, the diseases progress with great rapidity. Familiar examples of diseases by fungi are rusts and smuts of corn, potato rot and mildews (see RUST; GALLS; MILDREWS).

In bacterial diseases insects visiting the plant introduce into the cells bacteria, which, when once they have gained entrance, seem to be beyond control of remedy and cause the injury or death of the plant without delay. It is impossible to cure plants when once infected by bacteria, but it is possible to prevent the spread of the disease to the other plants, by utterly destroying those which are diseased. The chief examples of these diseases are fire blight of apples and pears, black rot of cabbage, and celery disease, tomato disease and sweet corn disease.

Certain insects, such as the eelworms or the phylloxera, attack various plants. The phylloxera attack grapes and have been very injurious to whole vineyards in Europe. Orange trees, roses and cucumber plants are also subject to the attacks of these worms. It is said that lime is a good remedy, and in greenhouses it is possible to free the soil from infection by baking or freezing it.

The physiological diseases are generally caused by unsanitary conditions, such as improper soil or lack or excess of light or water. The leaves generally turn yellow and drop, and the whole plant assumes an unhealthy appearance.

Prevention of plant diseases requires careful study. If the seed is suspected, it should be treated before planting with some solution which will kill the spores. Fields in which the disease has appeared should have the old stubble burned over and be cleared of all shrubbery and other objects in which the spores may find refuge, before plowing for the second crop. Even with these precautions it is wise to plant the field the second season with a different sort of grain, selecting something upon which these spores cannot feed.

DISINFECTANTS, a term derived from the Latin for *without infection*. It is applied to those substances which have the power of destroying disease germs. Disinfectants are widely used for sterilizing surgical instruments and other equipment used in operations, and for disinfecting the furnishings of rooms in which patients with infectious diseases have been nursed. Among

the important substances so used are chloride of lime, carbolic acid, cresol, formaldehyde and iodine. See ANTISEPTIC.

DISPENSARY, a place where free medicines or free prescriptions are given to poor patients who are able to apply in person for them. In nearly all large cities such places are supported by private funds or as a regular branch of public benefaction. Though sometimes dispensary privileges are abused by the well-to-do, these institutions are of such benefit to the poor that they deserve to be a permanent form of social service.

DISPENSATION, a license or special privilege granted by an authorized Church official to a person who desires to be excused from complying with some Church rule. In the Roman Catholic Church, for example, parish priests have the right to *dispense* their parishioners from observing fasting or holy days, but in matters of highest importance the power of dispensation rests with the Pope or other high dignitaries. In the Church of England the Archbishop of Canterbury may grant special licenses for the performance of the marriage ceremony without the publishing of banns, while the bishops are empowered to give clergymen special permission to hold more than one charge or to work outside of their parishes.

In fraternal organizations dispensation is the permission granted by the highest authority to subordinate lodges to perform some act not provided for in the regular rules or routine.

DISRAELI, *dis ra'li*, BENJAMIN, Earl of Beaconsfield (1804-1881), an eminent English statesman and writer. He was the eldest son of Isaac Disraeli, a man of letters, who with his family in 1817 renounced Judaism and joined the Church of England. Benjamin studied law, but finding it distasteful, turned to literature, and in 1826 brought out a novel, *Vivian Grey*, a marked success. In the ten years following, Disraeli traveled in Europe, wrote intermittently and became interested in politics. In 1837 he was elected to Parliament as a Tory member from Maidstone



BENJAMIN DISRAELI

During his first years in Parliament he supported Peel, but when Peel gave his support to the repeal of the Corn Laws, Disraeli withdrew from his party and soon became recognized in the House as leader of the protectionists. Some years later, feeling that the people did not wish longer a protection policy, he abandoned it. He was made Chancellor of the Exchequer in 1852 and three times subsequently he served in the same office.

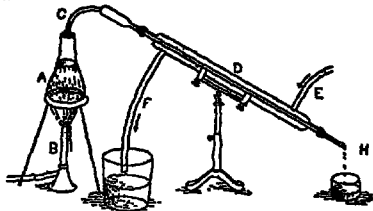
In 1868 Disraeli became Prime Minister, but his party was defeated at the next election, and not until 1874 did he again come into power. This time, however, he had come in with a strong Conservative majority, and he remained in power for six years. Disraeli as Prime Minister introduced many reforms, but his administration was chiefly noteworthy for its foreign policy. The gaining control of the Suez Canal, the proclaiming of Victoria as Empress of India and the compelling of Russia by the Treaty of Berlin to abandon a part of its ambitious plans against Turkey were the most important events of his ministry. During his term as Prime Minister, too, Disraeli entered the House of Lords as Earl of Beaconsfield. His party was defeated in 1880, and Disraeli withdrew into private life.

His novels, most noteworthy among which are *Henrietta Temple*, *Coningsby*, *Tancred*, *Sibyl* and *Lothair*, are of great interest, because they deal, from the point of view of an insider, with fashionable social life of the time.

DISTEMPER, an animal disease caused by a germ producing catarrhal inflammation. The lungs, nose, eyes or nervous system may be attacked, and the initial symptoms include trembling, chills, weakness and failing appetite. As an attack progresses it is characterized by inflammation and watering of the eyes, sneezing, coughing, restlessness and loss of flesh. Distemper attacks various domestic animals, but especially young dogs. Preventive treatment by the Laidlaw-Dunkin method produces immunity after a lapse of time. By the Little method the dog is given the disease by injecting the virus on one side, then introducing the serum immediately on the other side of the body. Immunity follows at once. This discovery followed after many years of research.

DISTILLATION, *dis til a'shun*, a process of boiling liquid, such as water, and con-

lensing the vapor thus formed. The object of distillation is to separate the liquid from the impurities contained in it. The illustration shows a distilling apparatus. Water to be distilled is placed in the reser-



ILLUSTRATING THEORY OF DISTILLATION

voir marked *A*. Beneath this is the light for heating. The steam passes through the connecting tube *C* into tube *D*, which is enclosed in a larger tube supplied with cold water from the pipe *E*. As soon as the steam reaches *D*, which is kept cool with the surrounding cold water, it condenses, or becomes liquid again, and discharges into the cup marked *H*. The running water which cools the tube *D* discharges through the pipe *F*. After a certain time all the water in *A* will have passed into *H*. This water, called the distillate, is pure, the impurities which are contained before distillation remaining in the receptacle *A*.

Destructive Distillation. In ordinary distillation substances do not undergo a chemical change, but what is called destructive distillation brings about such change. Wood, heated in a closed vessel, is changed to charcoal, while impure acetic acid, tar and some other bodies are driven off and condensed. When coal is so heated coal gas is produced; ammonia fumes are driven off, but not condensed; tar is driven off and condensed; coke is left behind.

Fractional Distillation. Not all liquids boil at the same degree of temperature. Therefore if a liquid composed of several mixtures such as crude petroleum is to be distilled the heat must be regulated by a thermometer. At a certain low temperature petroleum ether vaporizes and passes to a condenser. When vapor stops rising at this temperature it is an indication that all the petroleum ether has passed out. The tube to this condenser is then closed, the temperature increased, and the tube opened into another condenser intended to receive the next product, which is naphtha. In this manner benzene, gasoline, paraffin, heavy illum-

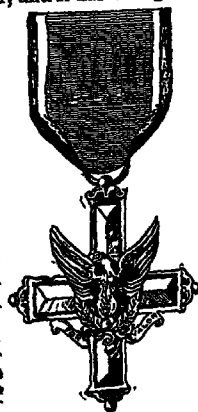
inating and lubricating oils, all products of petroleum, are separated and refined. This process is called fractional distillation.

DISTILLED LIQUORS, alcoholic liquors manufactured by the combined processes of fermentation and distillation. They may be made from raw material or directly from material which has been fermented, as in the manufacture of brandy by distilling wine. Most of the liquors, such as rum and whisky, are made directly from the raw material, corn, wheat and other grains being used. In some countries potatoes are used instead of grain. The grain is ground and soaked in warm water, preparing what is called the *mash*. Yeast is then added to this, and it is allowed to ferment, forming the *wort*. From this the spirit is distilled (see DISTILLATION). The distilled spirit usually contains numerous substances that are not desirable, and these are removed by redistilling at different temperatures or by allowing the liquor to stand for a long time, when they are either absorbed or evaporated. The purification is generally known as the process of rectifying. Rum is made directly from fermented molasses. See BRANDY; WHISKY.

DISTINGUISHED SERVICE MEDALS.

Before the World War the United States provided for but one award for bravery in defense of the nation. This is the Congressional Medal of Honor, and it has been given but sparingly since the Civil War. The World War created a need for awards on the battlefield which should not have to await Congressional vote in each case. In 1918 a law created two new decorations, the Distinguished Service Cross and the Distinguished Service Medal.

The Distinguished Service Cross, the most important of the new decorations, may be awarded—



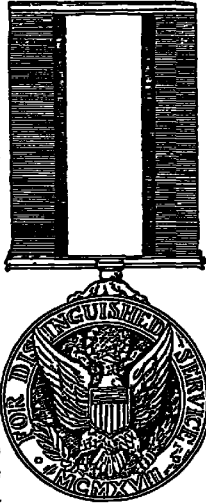
DISTINGUISHED SERVICE CROSS

"to any person who, while serving in any capacity with the army, shall hereafter distinguish himself or herself, or who, since April 6, 1917, has distinguished himself or herself,

by extraordinary heroism in connection with military operations against an armed enemy of the United States"

The Distinguished Service Medal may be awarded to any man or woman serving in any capacity with the army who has, since April 6, 1917, or shall hereafter—

"distinguish himself or herself by exceptionally meritorious service to the government in a duty of great responsibility in time of war or in connection with military operations against an armed enemy of the United States"



DISTINGUISHED
SERVICE MEDAL

The cross is for deeds of valor in the field solely, while the medal may reward meritorious service in civilian capacities as well as in military activities.

The distinguished service cross corresponds to the French *croix de guerre* (with palm), which may be won by both officers and men. There is no exact British counterpart (See *CROIX DE GUERRE*)

The commanding general in Europe was empowered to award either of the above upon receipt of cabled consent from the Secretary of War in Washington

DISTRICT ATTORNEY, a term limited in its use to the American republic, is a law officer of a county and also of the United States. The district attorney of a county is one of the county officers, known in some states as *county attorney*, or *prosecuting attorney*; he is the state's legal representative in the county, and is charged with the duty of prosecuting those who violate the laws of the state

A United States district attorney is an assistant of the Attorney-General of the United States in the Federal District in which he serves. He is appointed by the President and confirmed by the senate, for a term of four years. He prosecutes all violations of Federal laws within his jurisdiction. There are about 100 District Attorneys in the states and in Alaska, Porto Rico, Hawan, Canal Zone, and China

DISTRICT COURTS, UNITED STATES
See *COURTS*, subhead *United States Courts*



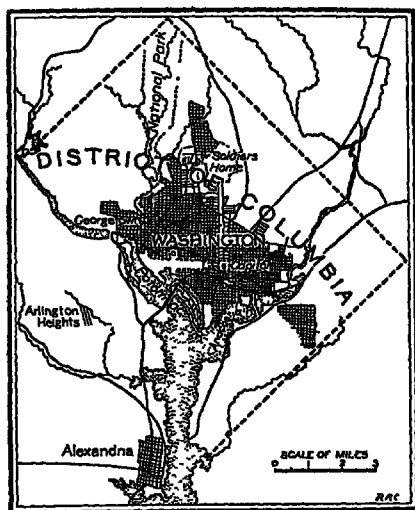
DISTRICT OF COLUMBIA, a Federal district within the United States which was organized to be the home of the general government. Provision for such a government center was made in the Constitution, which empowered Congress (in Art I, Sec 8)—

To exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular States, and the acceptance of Congress, become the seat of the government of the United States

Both Maryland and Virginia passed acts ceding such a tract to the United States, and in 1790 Congress passed a bill which established the tract upon the Potomac River, but left the President to locate it. This action of Congress, however, was not taken until after a very bitter debate among the members, many of whom felt it unwise to locate the seat of government in the midst of a comparative wilderness. But the choice was justified, in the minds of the public, because of George Washington's favorable opinion that the site chosen was "the only plot in the United States which had tide-water navigation, convenient access from Baltimore and other large cities northward, and superb natural sites." Originally, the tract contained exactly 100 square miles, a portion being on the south side of the Potomac, but this was ultimately ceded back to Virginia, and the present tract only, whose area is about 69 square miles, was retained. Besides Washington, Georgetown and Uniontown, there were within the District of Columbia several smaller villages, but the City of Washington now is coextensive with the entire District

The government of the District is in the hands of three commissioners, two of whom are civilians, directly appointed by the President, and the third, an army engineer detailed by the Secretary of War. They hold office three years and are empowered by Congress to make and change at will health and police regulations, but all formal laws

are passed by Congress. The commissioners appoint all subordinate officials. Each year they submit to the Secretary of the Treasury an estimate for all the expenditures of the District during the next year. Half of this amount is assessed as a tax upon the Dis-



trict, and the other half is appropriated by Congress. As the District is legally only the home of the Federal government the people residing in it have no vote. Government employees retain their residence in their home states and may go home to vote, when they so desire. The population of the District, census of 1930, was 486,869.

Related articles. Consult the following titles for additional information

Corcoran Art Gallery	Smithsonian Institution
Library of Congress	Washington, D.C.
Mount Vernon	Washington Monument
National Museum	White House
Potomac River	

DIVER, a water bird related to the grebe. The name is commonly applied to any bird that is a skilful diver. The true divers live chiefly in the Arctic regions, but come south in winter. The *great northern diver* and the *red-throated diver* are the most common species. The former has a white breast and a black back and wings, marked by white spots that present a checkerboard appearance, while the head and neck are glossy black and green, the latter with a collar of white streaks. The red-throated diver is duller in its coloring. In Scotland this bird is called the *rain goose*, while in the United

States and Canada the great northern diver is generally called the *loon*. The loon migrates as far south as the Great Lakes, and most of the small lonely interior lakes of that latitude have one or two pairs of loons a season. Their cries are peculiarly noisy ones, some of their notes resembling rough, jeering laughter. If suddenly startled, especially when they have young in charge, they go through the most astonishing antics on the surface and below the water, trying evidently to distract the attention of an enemy.



GREAT NORTHERN
DIVER

DIVIDE, in physiography the name given to the crest or water-parting which separates two river systems, or the drainage areas of two smaller streams. The term *watershed* is also used to indicate the same feature. A divide may be comparatively low land, with slopes so gentle that they can scarcely be traced, as the Height of Land, which extends east and west across the central plain of North America and separates the Mississippi basin from the land drained into Hudson Bay. It may be very high, like the divide in the Rocky Mountains, that separates the rivers which flow into the Mississippi basin from those flowing into the Pacific. Rivers sometimes cut transverse valleys through a high divide; but this never occurs with a low divide, unless in a few localities the level may be such that in high water one portion of the stream flows down one slope and another portion flows down the other. This is illustrated in the cases of Twin River Lake in Yellowstone Park and the Cassiquiare River in South America.

DIVIDEND, a cash return from capital invested in stocks of corporations. An investor in stocks is not sure of any return from his investment. He hopes that the business in which he buys shares will be profitable; if it prospers he will get his proportion of net profits. A dividend differs from *interest* in that interest is a fixed

amount guaranteed on notes and bonds, and must be paid. See CORPORATION.

DIVINATION, the act of foretelling future events or discovering things secret or obscure, by the aid of superior beings or by other than human means. In ancient times divination was divided into two kinds, natural and artificial. *Natural* divination was supposed to be effected by a sort of divine inspiration; *artificial* divination was effected by certain rites, experiments or observations, as by sacrifices, observation of entrails and flight of birds, lots, omens and the position of the stars. This sort of divination was practiced by the conjurers, or medicine men, of the American Indians, and traces of it are still found among some tribes.

DIVINE RIGHT OF KINGS, the belief that sovereigns derive their right to rule from God, and that the people's disregard of their absolute authority constitutes a sin against God. This doctrine, celebrated in English history, especially in the time of the Stuarts, and in French history of Louis XIV's time, was defended in the twentieth century in the utterances of William II of Germany. With his defeat in the World War the theory died.

DIVING, as an occupation, is the act of working under water, either with or without a supply of air. In the tropical regions the natives on the shore and those living on islands become expert divers in their quest after sponges and other salable articles obtained from the sea. Some of these are able to remain under water for two minutes, but they suffer from the effects of holding their breath so long.

The oldest successful diving apparatus, known as the *diving bell*, consists of a dome-shaped iron enclosure, open at the bottom and having a shelf or seat on which the diver can sit. When lowered into the water the air prevents the water from filling the chamber, and workmen can remain under water in a diving bell for a number of hours, provided they are supplied with fresh air. This is accomplished by forcing the air into the bell through a tube connected with a force pump, while another arrangement allows the foul air to escape.

In modern diving a specially devised waterproof suit is used, which has at the neck a metal ring. To this ring a copper helmet is screwed. The latter has circular glasses in front, for the diver to see through, and is equipped with two rubber tubes to

provide for the transmission of pure air and the carrying off of the impure. By means of a telephone arrangement the diver may readily communicate with his fellow workers and the attendant above him. He is enabled to sink and to keep his balance by the aid of leaden soles and of metal sheets fastened to his suit, and his equipment includes electric lights and all necessary tools. The standard apparatus generally in use in England and America was devised by an Englishman. Divers can now go down to depths exceeding 300 feet. The greatest diving feat in history occurred in 1935, when divers, after repeated attempts found the steamship *Lustana* (which see), sunk by a German submarine in May, 1915.

DIVINING ROD, a forked stick, by means of which persons formerly attempted to discover the location of minerals or water underground, believing that the rod, if carried slowly along by the two forked ends, would dip and point downward when brought over the spot where the mineral or water existed.

DIVISION OF LABOR. See LABOR, DIVISION OF.

DIVORCE, *divors'*, the dissolution of marriage by a competent legal authority. The significance of the term has of late been narrowed to include only the dissolution of the union from causes arising after marriage, the legal dissolution of a marriage which was void from the beginning being called *nullification*. The decree of divorce is now usually granted by the regularly-organized courts, but the rite was formerly purely private, no legal ceremony being necessary. Gradually, with the improvement of religious and moral codes, the laws of divorce have become more stringent. Divorce is not recognized by the Roman Catholic Church, and its priests are not authorized to remarry divorced persons. The same rule long held in England, until changed by an act of Parliament in 1858. Since that time divorces are granted, but rarely, and for only very important reasons.

The divorce laws in the United States are regulated by the states and are widely divergent. One state, South Carolina, does not allow divorce, and the principles governing legislation vary from this strict rule to the greatest laxity. Among the causes for which divorces are granted are unfaithfulness, desertion, habitual drunkenness,

cruelty, failure to support, gross immorality and incompatibility. In some states divorced persons may remarry without restriction, but in others the rule varies from absolute prohibition of remarriage to some slight restrictions as to time. In the case of divorce, if the wife is blameless she is usually granted a certain specified sum for her support, called *alimony*.

Within recent years there has been a great increase in the proportion of divorcees to marriages in the United States, and consequently, a growing movement in favor of stricter laws upon the subject. Some students of the problem demand the regulation of divorce by a national law. American divorcees in Mexico may be declared illegal.

In Canada the Dominion Parliament was originally the only legislative body having the power to pass marriage and divorce laws. But since 1918 the Prairie Provinces have granted divorces through their courts. In 1930 a Dominion Act gave jurisdiction in divorce cases to the Supreme Court of Ontario. Quebec is the only province in which a divorce is secured by a private act of Parliament. In Nova Scotia and New Brunswick courts may declare a marriage annulled for certain stipulated reasons.

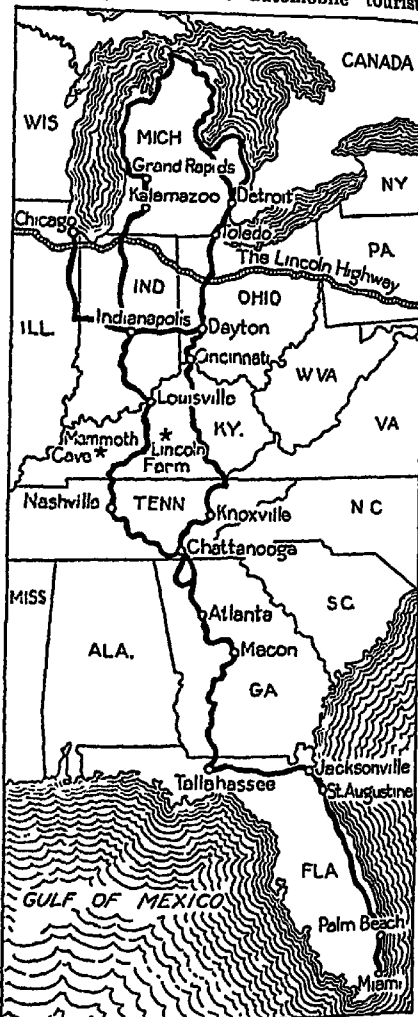
See MARRIAGE; HUSBAND AND WIFE.

DIXIE, or **DIXIE-LAND**, a term which came, by a popular error, to be identified with the South during the Civil War. The story goes that early in the nineteenth century a man named Dixie lived on Manhattan Island and kept there a large number of slaves, whom he treated with great kindness. When feeling against slavery began to grow intense, Dixie sent some of his negroes South, and they, sorrowful at leaving their kind master, sighed for "Dixie's land." Daniel Emmett, the author of the everpopular song *Dixie*, used the refrain, "I wish I was in Dixie," as an expression of Northern negroes who longed for the sunny South.

DIXIE HIGHWAY, an excellent surfaced road covering over 3,000 miles across the United States from north to south. The route has been marked throughout its length, and the highway in most of its course has been completed. Beginning at Mackinaw, Michigan, routes extend through opposite sides of that state and on through Ohio, Indiana, Kentucky and Tennessee, joining at Chattanooga. They again diverge for a short distance, then unite, and thereafter as

a single highway the course extends to Miami, Florida. From Indianapolis a branch reaches Chicago.

This new highway, in its inception, was designed to encourage between the North and the South more intimate acquaintance, in attracting numberless automobile tourists.



ROUTES OF THE DIXIE HIGHWAY

Of more importance, possibly, will be the greater incentive to local road building in all the states through which the highway passes, for it will demonstrate that good roads are a distinct asset to a community.

The Dixie Highway was first promoted in 1915 by a meeting of governors of states, who appointed local committees to lay out the route and to secure the cooperation of the people in the project. See LINCOLN HIGHWAY.

DIXON, THOMAS (1864—), American novelist and playwright, born at Shelby, N. C. In 1883 he received the degree of A. M. from Wake Forest College, N. C. Greensboro Law School conferred upon him the degree of LL. B. in 1886. The same year he was admitted to the North Carolina bar and to practice in the United States District and Supreme courts. His attainments won for him a scholarship in history and politics at Johns Hopkins University in 1883. Two years later he began to serve a term in the North Carolina legislature, but resigned to enter the ministry. He is author of several novels and plays, among which are *The Leopard's Spots*, *The Root of Evil* and *The Clansman* (made into the moving picture *The Birth of a Nation*), *The Man in Gray*, *The Southerner*, *The Victim*, *The Black Hood*, and *The Sun Virgin*.

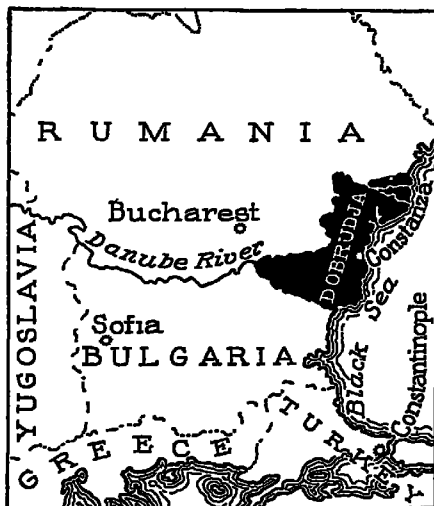
DIZZINESS. See VERTIGO.

DNIEPER, *ne'pur*, a river in Russia, one of the largest in Europe. It rises in the region about 200 miles southwest of Moscow and flows first southwest, then southeast and again southwest, into the Black Sea. At its mouth it has a breadth of ten miles. It is navigable for nearly its entire length of 1,400 miles and is therefore of great commercial importance. It flows through one of the most important wheat-growing regions in the world, and waters an area of 203,000 square miles. In its lower course there are important fisheries. Among its tributaries are the Beresina, the Pripet, the Desna and the Psiol.

DNIESTER, *nee'stur*, a large river of Europe, which has its source in the Carpathian Mountains in former Austrian Galicia. It enters Russia at Khotin and flows into the Black Sea, after a course of about 850 miles. Navigation, once difficult on account of frequent shallows and rapids, was rendered possible through improvements made by the Russian government for a distance of 500 miles. Large quantities of lumber, fish and grain are transported on its waters.

DOBRUJA, or **DOBRUDJA**, *do broo'ja*, a fertile district in Southeastern Europe,

bounded on the north and west by the Danube River and on the east by the Black Sea. It consists of two departments—Constantza and Tulcha—whose combined area is 8,969 square miles. At the outbreak of the World War it had a popula-



LOCATION OF DOBRUDJA

tion of 380,430. The population is mixed, consisting of Turks, Bulgars, Rumanians, Russians, Jews, Armenians and Germans. The Dobruja was annexed to Rumania in 1878. In May, 1918, by the Treaty of Bucharest, Rumania was forced to cede the territory to the Germanic powers, but this treaty was rendered null and void by the subsequent collapse of the Germanic alliance, in the fall of the same year. The boundaries of reorganized Rumania were re-established in 1919, and this disputed territory was restored to her. See RUMANIA; WORLD WAR.

DOCK, a name applied to various large, herbaceous plants belonging to the buckwheat family. The varieties common in the United States and Canada are known only as troublesome weeds, but the roots of other species are valuable on account of their medicinal properties. As much as 125,000 pounds of these roots have been imported into the United States in one year.

DOCKS, a word commonly used to mean a wharf—a long, narrow structure extending into the water, close to which vessels may be

tied securely The original meaning of the word, and the one yet correctly employed where the tides are high, refers to a solidly-built enclosure in which ships may be anchored, the dock being the basin containing the water which floats the ship; such a dock is not influenced by tides, because the water is held and does not recede with the ebb tide. Docks of this kind are known as *wet docks*. There are no high tides along the shores of the United States which require such shipping precautions, but there are a few such locations in Canada, notably in the Bay of Fundy, and many in Europe.

Dry Docks. These are built of strong masonry, and their entrance is closed by swinging gates, opening in the middle, or by a framework, called a *caisson*, built like the hull of a ship, with a keel and a stem at both ends. When the caisson is empty it floats and may be removed to admit of a vessel being floated into the dock. The caisson is then placed at the entrance and filled with water, again sinks into the grooves intended for it and closes the dock. The water is then pumped out, leaving the ship dry and supported by wooden blocks and props. Floating docks are made of wood or steel and are constructed in sections, any number of which can be fastened together to make a basin large enough for the ship. There are dry docks at nearly every great seaport.

DOCKYARDS, yards supplied with all sorts of naval stores, materials and conveniences for the construction, repair and equipment of ships of war. Another name for them is *navy yards*. There are eleven naval yards on United States territory. They are at Brooklyn, N. Y.; Portsmouth, N. H., Boston; Norfolk, Va.; Philadelphia; Washington; Charleston, S. C.; New Orleans, Bremerton, Wash.; Mare Island, Calif.; Pearl Harbor, Hawaii. Canada has dockyards at Halifax and Esquimalt (B.C.).

DODDER, a parasite, native of Europe and parts of the United States. It is a member of the convolvulus family. The plant starts from the ground, sends up long, twining, leafless, yellowish, threadlike stems which fasten themselves by rootlets to other plants. It then breaks loose from the soil and feeds on the plant to which it has attached itself. In maturity the plant is covered with dense clusters of small white flowers. Dodder is injurious to some crops

To minimize its destructiveness it is often found necessary to sift the seeds of clover, alfalfa and flax before planting. See **PARASITE**.

DODGSON, *dofson*, CHARLES LUTWIDGE (1832-1898), an English writer and mathematical scholar, best known as the author of those fascinating nonsense stories, *Alice in Wonderland* and *Through the Looking Glass*. Dodgson wrote under the name LEWIS CARROLL, except when he published certain weighty treatises on mathematics. The Alice of his children's stories was Alice Liddell, the daughter of the dean of Christ Church, Oxford. It was while he was a mathematical lecturer at Christ Church, between 1855 and 1881, that Dodgson became acquainted with the little girl and her sisters, and the adventures he so charmingly described were originally told to the children on afternoon boat rides down the river. He also published a series of *Sylvia and Bruno* stories. See ALICE'S ADVENTURES IN WONDERLAND.

DODO, an extinct genus of birds, said to be related to the pigeons. The dodo was a massive, clumsy bird, larger than a swan,



THE DODO

and covered with down instead of feathers. It walked on short, ill-shaped legs and had wings and tail so short as to be useless for flight. The birds were once numerous on the island of Mauritius, but it has been two hundred years since the last one was seen. Several perfect specimens are preserved in the British Museum. They furnish the world's sole present knowledge of the bird.



DOG, a common domestic animal, intelligent and faithful to man, yet belonging to the same family as the wolf, the coyote, the jackal and the fox. That the dog is so remarkably different from these enemies of man is the result of many centuries of domestication. Man tamed the dog in a day before the earliest history was written, and while he is docile and obedient, as a rule, there are instances in plenty when he momentarily drops the veneer of civilization and reverts to type, bristling hair and bared teeth proving his kinship with the snarling wolf.

The Dog in History. The dog has been almost universally the most intimate friend of man. The annual overflow of the Nile which makes cultivation of the valley possible comes at the same time as the appearance of a certain star above the horizon. The ancient Egyptians called this Sirius, or the "dogstar;" they associated the faithfulness and watchfulness of the dog with the star which appeared as a blessing on their industry. Some nations, especially the Hebrews and Hindus, regarded the dog as unclean. In Mohammedan and Hindu countries the most degrading epithet that could be applied to anybody was "dog." This epithet seems to be due to their hatred of their enemies rather than to a dislike of the dog: when the Israelites saw that their Egyptian enemies worshiped the dog, their hatred of the Egyptians made them think of the dog as an enemy. So, too, the Mohammedan or the Hindu, who saw the affection of the Christian for his dog, disliked the dog just as much as he disliked the dog's master.

Until the beginning of the Christian Era the dog seems to have been used only as the defender of the home and a friend and companion of the master. Now he was trained to pursue other animals. Whether this training developed the peculiarities of the "hunting dog" or whether only dogs that showed these peculiarities were chosen for training, is not important. The fact remains that for many years dogs were roughly classed as "sporting" and "non-sporting." The swiftness and the highly developed

power of scent are most noticeable in the sporting dogs, such as the pointers, setters and terriers.

It is not unlikely that all dogs sprang from one common source, but climate, food, and cross-breeding caused variations which in turn led to further breeding for special purposes. These variations have made some dogs better fitted for some purposes than any other dogs and so the breeding has gone on till there are now about two hundred breeds of domestic dogs.

Some have long, slender legs (for example, the greyhound), some have short, stout legs (for instance, the dachshund). Some have long, silky hair; some are almost hairless. Some have small, erect ears; others have long and tapering ears.

Classification. No entirely satisfactory classification of the different breeds of domestic dogs has been made, authorities do not all agree, but the following will serve for general purposes:

(1) **Wolflike dogs.** This class includes dogs of a large size, with long hair and erect ears, resembling the wolf in general appearance. Examples are the Eskimo dog and the collie.

(2) **Greyhounds.** Dogs of this class are slender, have fine, soft short hair and little power of scent. They are very fleet runners.

(3) **Spaniels.** This class is characterized by their long, hanging ears and curly coats. They all like the water and are used in hunting. The Saint Bernard and Newfoundland are conspicuous examples.

(4) **Hounds.** Hounds are distinguished by their short hair, long noses and long, hanging ears, and by the keen scent which guides them in tracing game.

(5) **Mastiffs.** These dogs have large heads and large, strong jaws, as in case of the bulldog.

(6) **Terriers.** This is a distinct class, including many varieties, which differ widely from one another. They have short or long hair, the ears are erect and the bodies are usually light.

The Dog as a Friend. We know that the dog has always been the companion and friend of his master. A dog will recognize his master's step or his voice; even if the dog cannot see or hear him he will recognize the scent. No other animal is so faithful to man; man appreciates and returns the devotion of the dog. One of the noblest tributes to the dog is part of an address to a jury made by Senator George Graham Vest during the trial of a man who had shot a fine dog belonging to a neighbor. The

Outline on the Dog

I. DESCRIPTION

- (1) Structure
- (2) Size
- (3) Characteristics

II. USES

- (1) Companionship and protection
- (2) Hunting
- (3) Work

III. CLASSIFICATION

- (1) Wolfhounds
 - (a) Eskimo
 - (b) Sheep-dog and collies
- (2) Greyhounds
 - (a) English
 - (b) Scotch deerhound
 - (c) Russian
 - (d) Lurcher
 - (e) Italian
- (3) Spaniels
 - (a) Setter
 - (b) Retriever
 - (c) Newfoundland
 - (d) St. Bernard
 - (e) Poodle
- (4) Hounds
 - (a) Bloodhound
 - (b) Staghound
 - (c) Foxhound
 - (d) Harriers
 - (e) Pointers
 - (f) Dachshund
- (5) Mastiffs
 - (a) English mastiff
 - (b) Bulldog
 - (c) German boar-hound
 - (d) Great Dane
 - (e) Pug
- (6) Terriers
 - (a) Fox terrier
 - (b) Scotch terrier
 - (c) Skye terrier

eulogy is so remarkable for its simplicity and dignity that we quote it in full:

Gentlemen of the Jury: The best friend a man has in this world may turn against him and become his enemy. His son or his daughter, that he has reared with loving care, may prove ungrateful. Those who are nearest and dearest to us, those whom we trust with our happiness and our good name, may become traitors to their faith. The money that a man has he may lose. It flies away

from him, perhaps when he needs it most. A man's reputation may be sacrificed in a moment of ill-considered action. The people who are prone to fall on their knees to do us honor when success is with us may be the first to throw stones of malice when failure settles its cloud upon our heads. The one absolutely unselfish friend that man can have in this selfish world, the one that never deserts him, the one that never proves ungrateful or treacherous, is his dog. Gentlemen of the jury, a man's dog stands by him in prosperity and in poverty, in health and in sickness. He will sleep on the cold ground, where the wintry winds blow and the snow drives fiercely, if only he may be near his master's side. He will kiss the hand that has no food to offer, he will lick the wounds and sores that come in encounter with the roughness of the world. He guards the sleep of his pauper master as if he were a prince. When all other friends desert, he remains. When riches take wings and reputation falls to pieces, he is as constant in his love as the sun in its journey through the heavens. If fortune drives the master forth an outcast in the world, friendless and homeless, the faithful dog asks no higher privilege than that of accompanying him to guard against danger, to fight against his enemies. And, when the last scene of all comes, and death takes the master in its embrace, and his body is laid away in the cold ground, no matter if all other friends pursue their way, there by his grave-side will the noble dog be found, his head between his paws, his eyes sad but open in alert watchfulness, faithful and true even to death.

How to Study Dogs. There will be no difficulty in interesting the children in the subject of dogs. Urge them to notice the different points of dogs. Let them treat the dog not merely as an object of study but as a friend. No better lesson than unselfishness and kindness toward weaker creatures can be taught children. Let them see for themselves that a dog appreciates a kind deed as much as the child does.

Every child has seen a dog wag his tail with pleasure at the sight of his master. What effect does a scolding have on the dog? Watch a dog eat. Does he gnaw or bite?

Study the head and muzzle. The different shapes will help to identify the breeds.

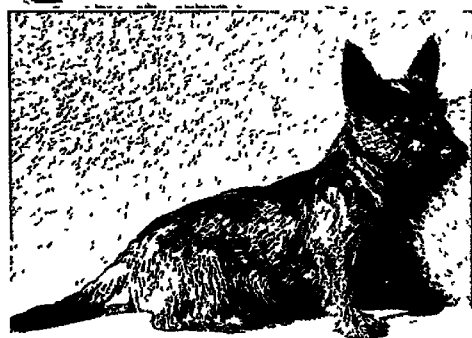
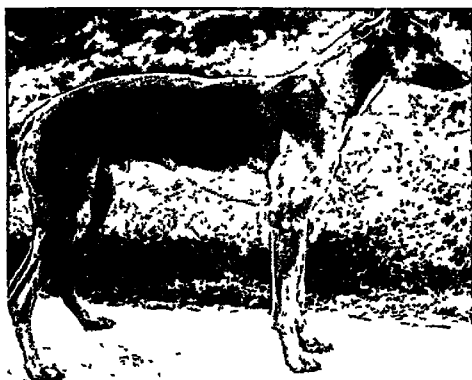
Notice the size and shape of the teeth. Differences in the shape of the ears are noticeable. The ear which droops over at the top is called a button ear. What are some other shapes of the ear?

Compare the position of the eyes with the position of the eyes in a rabbit.

Are all dogs' eyes of the same color?

Is there any difference between the forefeet and hindfeet of a dog? How many toes are there on each foot?

Each child should observe one dog for several days. This is a much better method of



1 Keystone, others Daily Gallows

DOGS BRED FOR VARIOUS PURPOSES

Upper left, the swift Greyhound; below, Scottish Terrier; at right, Belgian Police Dog.
at bottom of page, Setter.

[See over]



Ewing Galloway, 8 and 4, Keystone, 1 and 2

DOGS, FAITHFUL FRIENDS OF MAN

Upper left, Pomeranian; upper right, Wire-Haired Fox Terrier; below the latter, Bulldog;
at bottom of page, Saint Bernard.

[See over.]

teaching the habits of a dog than a general explanation

Let the child see that the dog is able to care for himself in a great many ways. Surely every child has seen a dog bury a dry bone at some time or other. Why is it that another dog occasionally finds the bone?

Have all dogs an equally developed sense of smell? Of hearing?

Kinds. There are so many kinds of dogs that it is impossible for the child to learn even the names of all of them. But he should know the chief classifications and some of the characteristics of each. Under the separate headings of spaniel, terrier, collie, etc., will be found descriptions which will be of great assistance in this study.

Name some of the breeds of large dogs. What characteristics make them especially useful to man?

Most of the small dogs are merely companions. What are some of them?

Where are wild dogs found?

Why are bloodhounds so named?

What other animals are included in the family to which the dog belongs?

How do dogs compare with other animals in intelligence and affection?

From what does the St. Bernard dog derive its name? For what is it famous?

What dog was used by Landseer as a subject for one of his famous paintings?

What are some of the traits which make the Newfoundland dog popular?

Which is the most celebrated of all strains of shepherd dogs? What characteristics especially fit it for the care of sheep?

What is the chief use to which the Eskimo dog is put?

What is the most distinguishing feature of the greyhound? From what is the name probably derived?

What special sense marks the difference between the hound and the greyhound?

Related Articles. Consult the following titles for additional information

Bloodhound	Poodle
Bulldog	Fug
Collie	Retriever
Dachshund	Saint Bernard
Dingo	Scottish Terrier
Foxhound	Setter
Fox Terrier	Shepherd Dog
Great Dane	Skyl Terrier
Greyhound	Spaniel
Hound	Spitz
Mastiff	Staghound
Newfoundland	Terrier
Pointer	Zoblogy

DOGBANE, a North American plant found between Canada and the latitude of Tennessee. One species grows to about four feet, has a smooth stem, milky juice and clusters of pink bell-shaped flowers. The root is bitter and is used as a substitute for ipecac to cause vomiting. Another species, called *Canadian*, or *Indian hemp*, is valued

for its fine, strong fibre, which is used by the Indians for weaving, and in net-making.

DOG DAYS, the name applied by the ancients to a period of about forty days, the hottest season of the year, at the time of the rising of Sirius, the dog star. Though the star now rises at a different time, we still apply the term *dog days* to the hottest season of the year.

DOGE, doge, the title of the first magistrate in the old Italian republics of Venice and Genoa. In the former the office was established in the eighth century; in the latter, in the fourteenth. The Venetian doges, for four centuries elected by the people and afterwards by the Great Council, held office for life. The doge of Genoa, until early in the sixteenth century, held a life incumbency, but the term of the office was afterwards restricted to two years. The office was abolished by the French in 1797. The doge's palace is one of the remarkable buildings of Venice to-day.

DOGFISH, a name given to several species of small shark, common around the British Isles, so named from their habit of pursuing prey like dogs hunting. The rough skin of one of the species, the *lesser spotted dogfish*, is used in polishing various substances, particularly wood. This species is rarely three feet long. The *greater dogfish* is from three to five feet in length. It is a blackish-brown in color, marked with numerous small dark spots. Both species are very voracious and destructive. Their flesh is hard, dry and unpalatable. The *common*, or *picked*, *dogfish* is common in North American seas and is sometimes used as food. On the Pacific coast oil is made from the livers of the dogfish.

DOGGEBANK, an extensive sand bank in the North Sea, about midway between the shores of England and Denmark, beginning about thirty-six miles east of Flamborough Head and extending in an easterly-northeasterly direction to within sixty miles of Jutland. In some places it is sixty miles wide. It is celebrated for its cod fisheries.

DOGMA, an article of religious belief, a doctrine of Christian faith. The history of dogma, as a branch of theology, traces the origins of, and the changes in, the various systems of belief. It shows what opinions were current among Christians in times past, the sources of the various creeds, by what arguments they were attacked and by what

supported, what measure of importance was attached to them at various times, the circumstances by which they were affected, and the manner in which dogmas were combined in systems.

DOG STAR. See **SIRIUS**; also **Dog**, sub-head *The Dog in History*.

DOG-TOOTH VIOLET, the common name for a plant of the lily family, which blooms in spring in Canada and the Northern United States. It is an odd-shaped plant, and is as oddly named, for it is not related to the violet, and does not resemble a dog's tooth. Two smooth and usually mottled leaves spring from a sealy bulb, and a single nodding yellow, purplish or white flower is borne from between the leaves on a short stem. An illustration of the dog-tooth violet in color accompanies the article **LILY**, on page 2106.

DOGWATCH, a nautical term designating two watches of two hours each (4 to 6 P. M. and 6 to 8 P. M.). All the other watches count four hours each, and if the dog watches were not introduced the same portion of the crew would always keep watch during the same hours.

DOLDRUMS, among seamen, the parts of the ocean near the equator, that abound in calms, squalls and light baffling winds. In the days of sailing vessels the doldrums were the despair of captains and crews.

DOLE, **SANFORD BALLAND** (1844-1926), a Hawaiian statesman, of American parentage, born in Honolulu. He was graduated at Williams College (Mass.) and was admitted to the bar in Boston. After some political activity there he returned to Hawaii, and his principal work has been inseparable from the history of the island. In 1893, after he had served as Supreme Court judge, he was placed at the head of the provisional government, and from 1894 to 1900 served as president of the republic of Hawaii. When Hawaii became a territory of the United States Dole was appointed governor (1900-1903), and has since served twelve years as United States district judge on the island (see **HAWAII**).

DOLL, a toy that is a favorite with small girls throughout the world, regardless of race, color or locality. So far back as history goes dolls of some sort have been played with by the children of all nations, for the instinct that makes a girl love to fondle and pet a figure of a baby is a universal instinct

of the female sex. The most elaborate dolls on the market to-day have jointed bodies, eyes that open and shut, beautiful wigs of soft hair, and a speaking apparatus by which they cry or say "Mamma."

A sort of earthenware known as *busque* is used quite generally for heads and bodies, but wood, China, papier mâché and wax are also employed for heads, and dolls' bodies made of cloth with sawdust stuffing are common. The figures may represent babies, society belles, negro mamies, soldiers, sailors, and so on, in great variety. Cloth dolls with printed patterns for hair and features are inexpensive and practicable toys for very little children. Rubber dolls are also popular. The doll industry is a factory industry in the United States, but in Europe large numbers of these toys are made in the homes of the peasants.

DOLLAR, a silver or gold coin, the unit of the monetary systems of the United States and Canada; its stated value, 100 cents. The table of comparative value of coins in the article **COINS** will explain the relative value of the dollar and foreign monetary units.

The name is derived from the Dutch *daler* or German *thaler*, but the coin used in the United States was patterned on "the Spanish milled dollar." The dollar was established as the monetary unit of the United States by an act of Congress under the Confederation in 1787, the decimal system of coinage having been established the year before. The first United States silver dollars were made in 1794. On March 14, 1900, an act was passed which made the gold dollar the standard in the United States; it was coined for some years, but because of its small size and consequent inconvenience in handling its coinage has been discontinued. The gold dollar has therefore risen in sentimental value; any person who wishes to purchase one must pay \$2 or \$3 for it. Few silver dollars have been coined since 1928. See **COINING**; **MONEY**.

DOL/OMITE, or **MAGNE'SIAN LIMESTONE**, a carbonate of calcium and magnesium. It is found in crystals, also massive, as limestone. Dolomite rock abounds in Europe, the mountains of Switzerland, Italy, Austria and England being formed of it. In the United States it occurs in the western part of New England, the eastern part of New York, Georgia and Tennessee. A variety called *bitter spar*, and sometimes *rhomb spar*, is found in crystals using the

form of a rhomboid. In color it is gray, yellow or reddish-brown, and it is semi-transparent. It is easily scratched with a knife. A second variety is called *pearl spar*; this has crystals with curved surfaces and is of a pearly luster. It is a good building stone, and certain varieties make fine statuary marble. Dolomite, when subjected to heat, yields a cement material which is used extensively for linings of Bessemer converters.

DOLPHIN, *dolfin*, an animal which forms the type of a family that includes, also, the porpoise and the narwhal. It inhabits every sea from the equator to the poles. The common dolphin measures from six to ten feet in length and has a sharp snout about a half-foot long. It is usually black above, gray on the sides and white beneath. Its flesh is coarse, rank and disagreeable, but it is used by the Laplanders as food. The dolphins live on fish and mollusca, and often they may be seen in great numbers around shoals of herring. They have to come to the surface at short intervals to breathe. The structure of the ear renders the sense of hearing very acute, and the animals are observed to be attracted by regular or harmonious sounds. Compactness and strength are the characteristics of these animals, and they swim with extraordinary velocity.

The dolphin is most common in the Mediterranean, but one species, the *bottle-nosed*, is caught on the coast of New Jersey. Other species which are taken off the coast of the United States are the *black dolphin* and the *spotted dolphin*. The name is also commonly but improperly given to a fish of the mackerel family, which changes its colors when dying, and shows many beautiful shades. In Greek mythology the dolphin was sacred to Apollo. Its image appeared on Greek coins and is said to have been represented on the shield of Ulysses.

DOME, a vaulted roof, in the shape of a hemisphere, or sometimes of an octagon or an ellipse, covering a building or part of it and forming a common feature of Byzantine and Renaissance architecture. *Cupola* is often used as a synonym, but, strictly speaking, the latter term refers to the interior, *dome* being applied to the exterior. In common usage, however, the entire structure is included under the name dome.

Most modern domes are semi-elliptical and are constructed of timber, but the ancient domes were nearly hemispherical and were

constructed of stone. The finest, without any rival, ancient or modern, is that of the Rotunda or Pantheon at Rome, 140 feet in diameter and 143 feet in height, erected under Augustus and still in perfect condition. Among others the most noteworthy are Saint Peter's at Rome, 138 feet in diameter, Saint Paul's in London, 102 feet in diameter, and that of the Hotel des Invalides in Paris, ninety-two feet in diameter. The largest dome in the United States is that of the Capitol at Washington, measuring ninety-six feet in diameter. A dome 152 feet in diameter was erected on the Palace of Horticulture at the Panama-Pacific Exposition, in 1915, but this was only a temporary structure.

DOMENICHINO, *do ma ne ché'no*, or **DOMENICO ZAMPIERI** (1581-1641), an Italian painter of great eminence, belonging to the Bolognese school. He was born at Bologna, and studied there and at Rome, where he painted his masterpiece, *Last Communion of Saint Jerome*, now in the Vatican, and numerous frescoes representing religious and mythological subjects. After four years in Bologna, he returned to Rome in 1621 and became principal architect and painter in the Papal Palace. The best of his later works are *The Four Evangelists* and *Diana and Her Nymphs Bathing*. Domenichino's distinguishing merit was the naturalness of his human figures. He was one of the first painters to use successfully naturalistic landscape as a background for human figures.

DOMESDAY, *dooms'day*, **BOOK**, or **DOOMSDAY BOOK**, a book showing the results of the land survey ordered by William the Conqueror, about 1086. The survey was made by commissioners, who collected their information in each district from a sworn jury consisting of sheriffs, lords of manors, presbyters, bailiffs, villeins—all the classes, in short, interested in the matter. The extent, tenure, value and proprietorship of the land in each district, the state of culture and in some cases the number of tenants, villeins and serfs were among the matters recorded. The survey was completed within a year. Northumberland, Durham, Cumberland and Westmoreland were not included in the survey, probably for the reason that William's authority was not then fully established in those counties. The Domesday Book consists of two volumes, one folio and one quarto. It has been twice republished, the last time (1861-1865) in perfect facsimile.

DOMESTIC SCIENCE. Not very many years ago those words would have looked very strange together; no one seeing or hearing them would have understood what they meant. The word *science* was, to most people, a word reserved for technical subjects. There was a science of geology, a science of botany, a science of astronomy; but about the domestic life, with its almost infinite number of big and little duties, there was little or nothing that was recognized as scientific. Even to-day, of course, the words would mean nothing to thousands and thousands of housewives, but gradually the ideas which they convey are becoming more and more widely spread, more and more willingly accepted.

Of late years scientific interest in all things has been increasing, and as a natural consequence scientific knowledge has been growing. That "domestic" science came late is due to the fact that it concerns itself with affairs which are so universal, so constantly and unobtrusively before our eyes as to seem commonplace. But little by little people came to see that there was, in the running of the usual household, an enormous waste of time, of energy, of money. Nothing like an adequate return was being received for the outlay that was made. The result, gradual and still uncompleted, was the systematizing of domestic affairs.

Changes in Household Occupations. Centuries ago the duties of a household were far different from what they are to-day. The women prepared all the food, cared for the house, spun the yarn, made the cloth from which clothing was made, and then in turn made the clothing. The education of a girl consisted largely if not exclusively of training in such household duties. But conditions within and without the home changed so that all of this became very different. First, there came the invention of machines which did much of the work women had been accustomed to do; it did not pay a woman to labor hours and weeks making "homespun," when factory-made cloth, as good and far more attractive, could be bought reasonably. The growth of factories of all kinds carried this result further and further; more and more industries were taken out of the hands of the housewives and transferred to factories. This tendency was strengthened by the growth of cities; when people lived by themselves, a long distance from a neighbor,

perhaps, they were dependent in large measure on their own resources, but when they moved to crowded centers of population they found many things within their reach which before it had been well-nigh impossible to obtain.

Then, too, the desires and ambitions of women have changed. They are no longer satisfied to spend every minute of the day drudging at housework, even work which is in itself very pleasant becoming the merest drudgery when it must be performed day after day without relaxation or recreation. Women have taken up other occupations, have discovered how good it is to be out-of-doors, have formed societies and clubs of all sorts; have, in short, built up for themselves a social life which makes demands on time and energy which to our grandmothers would have seemed incredible.

One of the results of these various facts is that many of the old household duties are becoming lost arts. The young girl is not trained in domestic affairs in the home; she has no time and little inclination for such things, and in many instances her mother has no more. Besides, conditions have changed so that the necessity for such home education is less apparent. Suppose a girl is called on some day to manage a household. It will, in many cases, be a steam-heated flat in which she will live. Everything for the flat can be bought—even the taste to furnish it, for there are people who, for a fee, supply ideas for the furnishing and decoration of homes. Her clothes can be bought ready-made, from the simplest shirtwaist to the most elaborate evening gown. Bakeshops and delicatessen shops supply cooked foods of all varieties, hot from the oven, if desired. Why should a girl spend time in learning to do things which she can so easily have done for her?

Importance of Domestic Science. The realization of the fact that the old household accomplishments are being in large measure neglected has had much to do with the zeal with which wise men and women have tried to advance the cause of domestic science. For the answer of the girl to whom we referred in the preceding paragraph to domestic questions is in reality far from being the right or the wise answer. There are problems in the household which can never be met until the housewife understands every detail of the management as thoroughly as

did the old-fashioned housekeeper, even if she does not do nearly so large a proportion of the work. It is not necessary that a woman should go back to the days of the spinning wheel, and insist on making the cloth from which her winter suit is to be fashioned; but she should know enough about fabrics to judge wisely of the materials which do go into the suit. The cooking problem differs in a measure from the problem of textiles and of clothing; for while there are shops where foods of all kinds are prepared, and in many instances well prepared, there are reasons why the habitual patronizing of such shops is not a wise policy. In the first place, such prepared foods are by no means always so healthful; in the second place, they are far more expensive. In the case of meats, for example, it is estimated that one pays almost double for cooked meats—and then they are usually neither as palatable nor as digestible.

It is more true in the case of domestic duties than in almost any other class of industries that a person is fit to have things done for him only when he knows how to do them himself. A man who owns a shoe store does not need to know how the workman operates the machine which cuts out the soles; but a housewife can tell whether things are being done properly and economically only if she thoroughly understands every process. If she knows the price of the various cuts of corned beef, the length of time it takes to cook them and the consequent cost of fuel, she can easily tell whether or not she is paying an utterly unreasonable amount for cooked corned beef.

When we realize that it is an established fact that ninety per cent of the salary is paid out by the woman of the average household for shelter, clothing, foodstuffs, etc., we begin to understand how extremely important it is that the woman who is to oversee this outlay should be able to do it intelligently. If a teacher had before her a class of fifty boys, and knew that almost all of them were to be architects, she would certainly find her teaching much modified by that fact. With a class of girls, it is known for a certainty that a large proportion will be engaged in some phase of home-making. Is it not of importance, then, that some recognition should be made of this fact in their teaching?

Necessity for Knowledge of Foodstuffs. The question of food is naturally one of the

first and most important problems taken up by the student of domestic science, or domestic economy, as it is sometimes called. The points to be covered in the study of foods are many—why we need food, what kinds we need, how much we need, how it should be prepared, what it costs, and so on. We need look no further than our regular newspapers and periodicals to convince ourselves that this subject is becoming a vital and a generally interesting one. Nearly every newspaper we pick up gives a corner to some phase of the problem—perhaps to the question of the healthfulness of certain foods, perhaps to economy in the preparation of foods, perhaps merely to recipes. And then, there are whole magazines devoted to such questions as diet and vegetarianism. You may pick up a magazine one day which proves conclusively that only raw foods should be eaten if the highest standard of health is to be maintained; the next day you may read equally convincing articles to the effect that all foods should be thoroughly cooked. These references do not mean that the present brief treatment of the subject is to be argumentative, is to advance any theory or champion any idea. They are simply brought forward to prove that the question is a live one.

It is not the purpose of the present article to give exhaustive technical information on foods and foodstuffs, the average housewife does not need such extended acquaintance with the subject. She does need, however, general information as to the elements required by the body, the foods which can supply those elements, and the combinations of foodstuffs best calculated to work good results. Such information can be given in a form which is comparatively untechnical, so that the housewife or student with little or no previous training in science can understand it.

It is true that a large proportion of diseases are traceable directly to the stomach, and many of these might be prevented if intelligent care were exercised. If the housewife understands this fact, it will help her to realize as nothing else can the necessity for knowledge of foodstuffs.

What the Body Needs. A plant growing in soil which is well suited to it takes up just exactly those substances which it needs to make it grow best. There are certain things it draws in through its roots and

leaves and manufactures into food; the other elements of the soil it disregards altogether. In the same way, there are certain substances which the body needs—without which it cannot do its best work. But the body cannot always get just what it needs as simply as does the plant. Certain necessary elements are not given to it at all, or are given only in inadequate quantities; certain hurtful elements are thrust upon it, or things which in themselves are harmless are given to it in too large quantities.

It stands to reason that the food of the body, taken as a whole, must contain all the elements which the body contains. We do not need, in a discussion of this sort, to consider these in detail, or even to mention them all. The elements do not exist by themselves; they combine to make up the various substances which we use as food; for example, hydrogen and oxygen, two very necessary elements, are found combined in water.

There are three things which food must do—it must furnish materials for replacing worn-out body tissues; it must give energy for work, and it must supply animal heat. Of course, no one kind of food can perform all three of these functions equally well, and that is why we need a mixed diet. That is why, too, certain combinations of food, as, for example, cheese and meat, are not considered good—they provide too much of one element and not enough of some others.

Food-substances in general may be divided into three groups—minerals, substances which contain nitrogen, and those which contain no nitrogen.

Chief of the mineral substances is water. We all realize that water is extremely important, in fact that we could not live without it, but probably we do not appreciate how universal it is. All foodstuffs contain it, in varying percentages from ten to ninety-five, and from two-thirds to three-fourths of the body consists of it. Every part of the body contains it, even the enamel of the teeth, though of course there the percentage is very small. Water furnishes no energy, but as a solvent it aids digestion, and it has an important part to play in the replacing of worn-out tissue by new.

The other minerals needed by the body include such things as lime, salt, soda, and iron. Though the proportion of such substances in the body is small—not more than about five per cent—they are absolutely

necessary, and it has been proved that if all the other food elements are supplied in proper quantities but these mineral substances are lacking, death is the certain result. However, it is not often that one has to plan on supplying these minerals; the ordinary diet contains enough of them to supply all needs, except in unusual cases.

The second class of foods named—those compounds containing nitrogen—is a large and very important class. The name given to these foods is *proteins*, and since the name is becoming quite common we shall make use of it here. There are three classes of proteins, the first and most essential of which is called *albuminoids*. Albumen exists in the lean part of meat, the white of an egg, the casein of milk (that part which is coagulated by acids) and the gluten of wheat. These substances are absolutely necessary; life cannot go on without them. All of the three functions which food must perform—the building up of tissue, the supplying of energy, the supplying of heat—these substances perform. They do not, however, perform them all in equal degree, and so other foods are necessary. But the albuminoids are more nearly capable of maintaining life unaided than is any other class of substances.

The second class of proteins, called *gelatinoids*, is not nearly so necessary, though these substances have certain qualifications which make them valuable. They are very easy of digestion, and are for that reason often given to invalids and convalescents. The typical example of this form of food-stuffs is gelatin.

The *extractives*, the third class of proteins, include the juices obtained by soaking meat in water, at a low temperature—not much higher than 160° Fahrenheit. The beef tea so much used for invalids is made by this process. Formerly it was believed that there was much nourishment in such beef tea—that it contained all the strength of the meat; but it is now known that such things really supply nothing for the maintenance of the body, and it is not unlikely that people have been starved to death while being fed on supposedly nutritious beef tea.

The third division of food-substances—those compounds which do not contain nitrogen—is divided into two classes, called *carbohydrates* and *hydrocarbons*. We use these technical terms simply because there are no other names to use in their stead, but it is

not necessary that we should know the chemical compounds of the substances. When the term carbohydrates is used we may understand a class of substances of vegetable origin, of which sugar and starch are the most important. These compounds furnish much of the energy of the body, and some animal heat, but the chief heat-producers are the other class of this third division—the hydrocarbons. These are the oils and fats of all kinds, whether of vegetable or animal origin.

It is important that the food taken into the body should not only contain the right elements but that it should contain them in the right proportion. Physicians and chemists have spent much time and thought in figuring out just what this proportion should be. Tests have been made by having people eat different kinds of foods in different proportions, and some interesting facts have been discovered. Of course the results of such tests never could be expected to be absolutely alike, but the best authorities agree that to keep in good health the average grown person should have each day food which will provide him with food elements about as follows:

Protein, $1\frac{1}{2}$ ounces; fat, $1\frac{1}{2}$ ounces; carbohydrate, 16 ounces.

This translated into terms of food such as we eat would be about $5\frac{1}{2}$ ounces of beef, $1\frac{1}{2}$ ounces of butter, 6 ounces of potatoes, and 19 ounces of bread. Of course such a statement does not mean that we must have every day just those articles; if some other kind of meat is used, which contains more fat, less butter is required, if cheese is used, the quantity of meat may be lessened; the starch-furnishing potatoes may be replaced by other starchy foods, and the bread may include cake or other things which have largely the same ingredients as bread. But practically these proportions should be maintained. There are, naturally, many things which are not taken into account here; nothing is said, for example, of water, of which any normal diet should contain a goodly quantity.

Special Foods

Water. Since water is such an extremely important part of our diet, it may well be given very serious attention. As clear, pure water is a good preserver of health, so impure water is one of the greatest breeders of disease. The question can never be "Shall I

drink water or not?"—it must always be "What kind of water shall I drink?" The word *pure* as generally used is really a relative term; no water is strictly pure except distilled water, and a very, very small proportion of the water used for drinking purposes is distilled.

The water that we use comes from wells, lakes, rivers and springs, and all of it contains, in greater or less degree, lime and other salts. These, however, unless they are present in unusually large quantities, do no harm; the danger in impure water comes largely from the presence of decaying vegetable or animal matter. Such diseases as typhoid fever and diphtheria are often caused by impurities in the water supply, as are various forms of more or less violent intestinal disorders. In the case of those living near wells or springs from which water is secured, the greatest care should be exercised. No refuse of any kind, liquid or dry, should be thrown on the ground near the well or spring, or above it; for almost certainly, if such a thing is done, the impurities sink through the ground and find their way to the source of the water supply. People in towns or cities which have a public water system can of course have no such personal supervision over the source of the water supply; but they can exercise care enough to assure themselves of the purity of the water which is supplied to their homes. The safest way is to have samples of the water analyzed by a chemist, but there are certain simple and fairly good tests which anyone can make as to the conditions of the water.

The first one is the test with permanganate of potash, which may be made as follows:

Partially fill a clean teacup with the water to be tested, and add about sixty drops of weak sulphuric acid. Then pour in a weak solution of permanganate of potash (crystals of this substance can be obtained at any drug store) until the water in the teacup becomes a deep rose color. If there is harmful organic matter in the water, the beautiful color will soon disappear.

A still simpler test is as follows: Into a bottle which holds about two ounces of water drop granulated sugar equal in quantity to a pea. Place the cork in the bottle, and set the solution in a warm place for forty-eight hours. If the water, when the cork is removed, has an unpleasant smell, it is too impure to be safely used.

As to the methods to be used in purifying water, there are two in common practice. First, there is filtering, the simplest method, though not the most satisfactory. For filtering, while it does remove some impurities, is likely to allow some of them to pass through. The other method is boiling. This kills the organic matter and renders the water practically safe. It has, however, one drawback—it leaves the water flat and insipid; but if the water is poured back and forth from one vessel to another several times, it takes up again some of the gases which it loses by the boiling process, and tastes much more like fresh water.

The great importance of an uncontaminated water supply is being universally recognized. A number of states have already passed laws prohibiting public drinking cups at public fountains and in stations, office-buildings, department stores, and all places where a large number of people would be likely to use such drinking cups.

Milk. This important food is discussed under its proper heading in a separate article.

Eggs. Eggs are in their chemical composition very much like milk, but they are not so perfect a food, for they lack one important food element—the carbohydrates. However, if eggs are served with some starchy food, such as potato or rice or white bread, they form a complete food. At almost all seasons of the year eggs are cheaper than the choice cuts of meat, of which they take the place excellently. It is not, however, as a food in themselves that eggs are most important, but as an ingredient in innumerable combinations. Experiments have shown that eggs are much more easily digested if they are cooked at a temperature of from 150° to 180° Fahrenheit, and since this is also the proper temperature for milk, dishes composed mainly of milk and eggs, such as custards, should not be heated above that point. Of course, if corn-starch is used, it requires a higher temperature, but it is usually possible to cook the starch before the eggs are added.

Meats. There is no difference of opinion as to the absolute necessity of water; there is little difference of opinion as to the value of eggs and milk. But when we come to the subject of meat, opinions do differ. Many people insist that meat is not a fit article for food, that it does actual harm; others merely

believe that it is not necessary. However that may be, it is certain that most of us use meat, and it is equally certain that almost always meat forms the most expensive part of the daily food. In many cases, by the expenditure of a little thought and care, substitutes for meat, such as cheese, nuts or eggs, can be used; in other cases, the more inexpensive cuts might be used, with no decrease in the nutritive value, and sometimes even with an increase.

At the outset of any study on meats there is one important topic which must be taken up—the selection of meat. By buying guaranteed milk or eggs we are fairly sure that we get the best of those substances which the market affords; but it is not enough to request the butcher to send meat that is fresh and not tough. Meat, more than any other article of food, should be selected by the housewife; only then can she be sure that she secures what she wants. A little study will acquaint her with the different cuts, and with the comparative values of them as foodstuffs. Almost any butcher will be glad, at an hour when he is not too busy, to help a customer in acquiring the knowledge she needs, for intelligence in buying will make his work easier. We give here an illustration which shows the location of the various cuts of beef; it is impossible to give such diagrams of all the animals whose flesh is used as food, but they are all built much on the same plan.

The first thing to consider in buying meat is the color and grain—good or poor meats may usually be distinguished in that way. Good beef is firm, fine-grained, of a purplish red when first cut, but changing very quickly after exposure to air to a bright red. The fat should be of a light straw color, the suet firm, white and crumbly. If the lean is dark-colored, coarse and flabby and the fat dark yellow, it is certain that the beef is of poor quality. Veal, at its best, is fine-grained, tender and almost white; the fat is firm and white. If the flesh is flabby and has a bluish tinge it should never be eaten, as it is absolutely unhealthful. In mutton, the bones should be small, the meat fine-grained, rich red and juicy, and the fat white and firm. There should be plenty of fat, as a lean animal does not yield good meat. Spring lamb is from six weeks to about six months old. The lean of the meat should be pink, the fat delicate and white. Fresh pork,

above all other meats, if used at all should be of good quality, for pork which comes from animals in poor condition is very harmful. It is absolutely necessary that pork should be thoroughly cooked; there is no part of it that may be left "rare," as is done with steaks and lamb chops.

The meat from different parts of the animal varies in several ways; some of it is

a prime animal, excellent for a roast, as are the ribs from B to C. Unless, however, the meat is tender, it is better used for braising or for pot-roasting. The flank and the leg are used for stewing or for making soup.

Broiling Though raw meat is easily digested, we do not serve it on our tables. In order to make it more appetizing in flavor and more attractive in appearance, we cook

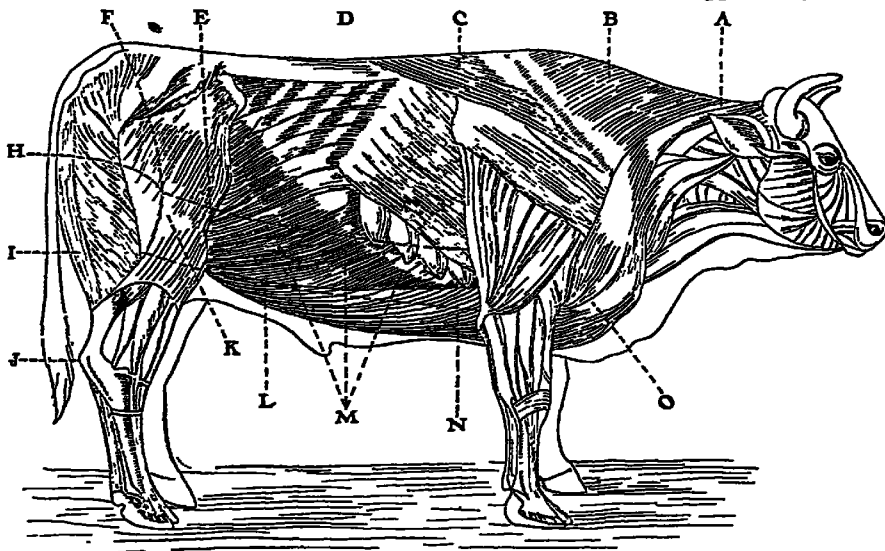


DIAGRAM SHOWING CUTS OF BEEF

A, neck; B-C, chuck ribs and shoulder-blade, C-D, seven prime ribs, D-E, porterhouse; E-F, thick sirloin; F-H, rump, H-I, round, J, leg, K, top of sirloin, L, flank, M, plate piece; N, O, brisket.

tough, some tender; some is dry, some juicy; some has much flavor, some is comparatively tasteless. These differences determine largely the uses to which the various parts are put.

The loin of beef (D to F in the figure) is considered the choicest part, and is therefore the most expensive. It is used for roasts or steaks, giving porterhouse, sirloin and short steaks. The prime ribs, as they are called (C-D in the figure), are used for roasting. It is poor economy to buy one rib, even though the family is small; two will give much better results, and the "leftover" may be utilized in many ways.

The meat from the top of the round is often used for steaks, and while it is not always very tender, it has a good flavor. It is fine, also, for pot-pies or for boiling; since it has little bone and almost no fat, there is little waste. The rump is sometimes, from

it, and the cooking may be done in various ways. Primitive men, of course, had no way of cooking their meat except before or over an open fire, and we have kept their method in the simplest of our ways of cooking—that is, broiling. This method is used in cooking tender cuts of meat, such as steak, chops and cutlets, and for some kinds of fish. The heat at first should be intense, so that the surface may be quickly seared. In this way the juices are prevented from escaping. After the coating is formed on the outside, the heat should be lessened. To cook a steak or chop about one inch thick to medium rareness, keep it close to the fire for about two minutes, then draw it a little distance away. It should be turned often.

Roasting Roasting was originally practically the same as broiling, the only difference being in the thickness of the piece or

meat to be cooked. However, such constant attention and such frequent turning were necessary that the old open-fire method of roasting was given up; what we call roasting to-day is practically baking. The same principle holds as in broiling—the heat should be great at the outset and then decreased. A temperature of 350° Fahrenheit is none too great for the first half-hour or thereabouts, until the meat is browned on all sides. The heat should then be checked, a temperature of somewhere near 200 being sufficient for the remainder of the time. Roasting meat should be basted frequently with the drippings in the pan, as this makes the meat juicy.

Boiling. Meat to be boiled should be, like that to be broiled or roasted, subjected to severe heat at first, that the juices may be kept in. It should be put into boiling water and boiled rapidly for fifteen or twenty minutes; then the heat should be lessened until the water barely simmers. When a bubble of air rises from the bottom of the pan every few seconds, the temperature is about right. All boiled or stewed meats are far more tender, juicy and nutritious if cooked in this way than they are if boiled rapidly. It takes, however, a longer time to cook them done. A fairly good-sized piece of fresh beef must cook for about five hours to be well done; a ham of about ten pounds, or a piece of corned beef, unless it is very thin, will take about the same time. The "fireless cooker" is very satisfactory in boiling or stewing meats, just for the reason that it keeps them for hours at a simmering point. The meat is boiled for fifteen or twenty minutes, then the kettle is covered closely and placed in a box which is filled with hay, or some other non-conductor of heat. The box is then made as nearly airtight as possible, and the water remains hot enough to cook meat for several hours.

Stewing is practically the same as boiling except that it is done in less water, and that the meat is usually cut up into smaller pieces. The temperature must be kept considerably below the boiling point. In braising and fricasseeing and pot-roasting the meats are first browned in hot fat and then stewed slowly.

Frying. Properly speaking, frying is boiling in hot fat, but the name is more commonly applied to the process of cooking in a pan, the bottom of which has been covered

with fat. The former method is the better, as it is not so wasteful of the fat, which may be used more than once, and as it preserves the juices of the meat or fish better. The temperature of fat suitable for frying ranges from 300° to 400° Fahrenheit. Frying is the least healthful method for the preparation of food, and should not be used often.

Soup-Making. As in roasting or boiling the object is to keep the juices in the meat, in soup-making the object is to draw them out. Consequently the meat is cut into small pieces and put into cold water, which is then gradually brought to a temperature near the boiling point.

Starchy Foods. Starchy foods include various things besides starch, but the starch is the important principle in their makeup. All vegetables do not contain starch—for example, carrots, onions, turnips and tomatoes; but many of our important vegetables, as potatoes, beans and peas, are largely composed of it. The cereals, too, are starchy foods.

In cooking milk, eggs and meat we have seen that the most satisfactory method is to keep them throughout at a temperature well below the boiling point. With vegetables no such caution is necessary; in fact, most vegetables are better if cooked at a temperature above the boiling point, and all vegetables should be thoroughly cooked, though not overdone. Some vegetables, as potatoes and squash, have water enough in their composition to cook themselves and may accordingly be baked, or boiled in just enough water to cover them. In boiling meats, it is better to have the cover pushed a little aside, that the air may escape; but vegetables are better cooked with a tight cover to the kettle.

There are certain kinds of vegetables, such as lettuce, radishes, cress and celery, which are usually eaten raw. This is not only because they taste better in this state, but because they are more easily digested. In eating raw foods of any kind, it is always very necessary that they be clean and fresh.

Nutritive value is not the only thing to be considered in the selection of a dietary. Some foods, especially certain fruits and salads, contain little nutrition but are of the utmost importance because of their effect on the digestive process. They bring about certain reactions which are very helpful. Fruit and salads should form an important item in the diet of every normal person.

The grains, wheat, rye, corn, barley, oats, which are from six- to seven-tenths starch, are chiefly used in two ways—as cereals and in doughs. Doughs include any mixture of flour of any sort with milk or water, no matter what the proportions or what the other ingredients may be. As in the case of starchy vegetables, it is necessary that all cereals and all doughs be thoroughly cooked, as underdone starch is very indigestible. Many housewives dry out their bread in the oven after it has been cut, and it is certain that some people can eat such twice-baked bread who cannot with comfort eat fresh, soft breads.

It is hoped that enough has been said to show in what a proper diet should consist. To sum up: the weight of authority seems to decide that a mixed diet is best—that vegetables and other starchy foods, fat in moderation, sugars, lean meat should all be used. The methods of combination are also important. As has been pointed out above, meat should not be served with eggs or with cheese—they supply more than is necessary of the same element. Starchy foods should, on the other hand, always be served with eggs, for eggs lack the starch elements. Watery vegetables and fruits should not be used together to make up a meal, as the combination is likely to cause fermentation.

Sanitation and Ventilation

There are no more important questions connected with the home than those of sanitation and ventilation. If people always built their own houses, a wise supervision at the time of construction could settle many problems once and for all. By far the larger proportion of people, however, live in houses or flats that have been built by others, and in those cases the most that can be done is to exercise great care in the selection of a location and to remedy so far as possible existing defects.

Drainage. The drainage is an extremely important point. Stagnant water should never be allowed to remain near a house, as it breeds all manner of diseases, and shows, moreover, a defective drainage system. If a house stands by itself, in a neighborhood where there is no sewage system, it is absolutely necessary, if the inhabitants are to keep well, that drain pipes be provided to carry waste water from the premises. The custom of throwing the water out near the

house is as unsanitary as it is unsightly. Such a drain should empty as far as possible from the house—three hundred feet is a good minimum distance; and if possible the opening should be lower than the house. If a break of any kind is allowed to exist in drainage pipes for any length of time, much harm can be done by the injurious sewer gas.

Plumbing. Plumbing is a subject which is closely related to drainage. In communities where there is a public sewage system, the owners of houses have little to do directly with the drainage, but every family should understand the plumbing in its own house well enough to be sure that it is kept in proper order. A safe rule is that plumbing should be "open," that is, not boxed up, so that defects may be found easily; and that it should be as simple as possible. A plumber who is called in at any time to make repairs will gladly explain the simpler points of the system, so that small faults may be detected and corrected.

Water Supply. This is a point which should be second to none in the selection of a location for a home. The topic has, however, been fully discussed under the subject of food, and need only be emphasized here. The fact that there is a public system which supplies water to hundreds or thousands of homes does not necessarily mean that the water is always safe. Usually, however, the public is kept informed by the board of health as to the condition of the water supply so that proper precautions may be taken. In the country, where people depend on springs or wells, great care is necessary, especially in the case of the former. The ground near the spring should be guarded so that surface water cannot get in, and under no circumstances should waste of any sort be thrown near the spring. Wells should be lined to the bottom with cement, that surface water may not soak in from the sides, and should be as deep as possible. If there are inequalities in the ground, the well or spring should never be lower than the barn or outbuildings.

Cleanliness. Dust and dirt are not merely unsightly; they are harmful, as well. We have all stood in a darkened room to which only one sunbeam had entrance and watched the dust particles dance in the streak of light. It is hard, sometimes, for us to believe that the light has not some attraction for the dust—it seems impossible that all the air is

Outline on Domestic Science

I. FOODS

1. Classification

(a) Nitrogenous—Proteins

(1) Albuminoids

- (a) White of eggs
- (b) Blood serum
- (c) Lean meat
- (d) Casein of milk
- (e) Gluten

(2) Gelatinoids

(3) Extractives

(b) Non-nitrogenous

(1) Fats

(2) Carbohydrates

- (a) Starch
- (b) Sugar
- (c) Vegetable acids

(c) Mineral

(1) Water

(2) Salts and acids

2. Food Values

(a) Heat production

(b) Nutrition

3. Marketing

4. Cooking

(a) Purposes

- (1) To change food so that it becomes more digestible

- (2) To make food more appetizing

- (3) To free food from organic impurities

(b) Methods of applying heat

(1) Radiation

(2) Convection

(3) Conduction

(c) Special foods

(1) Milk

- (a) Production of butter and cheese

- (b) Changes produced by cooking

(2) Eggs

(3) Meats

- (a) Relative values of different cuts

- (b) Methods of cooking

(1) Broiling

(2) Roasting

(3) Frying

(4) Boiling

(5) Baking

(4) Starchy foods

(a) Vegetables

(b) Grains

(1) Cereals

(2) Doughs

(5) Drinks

II. CLOTHING

1. Materials

(a) Sources

(1) Cotton

(2) Wool

(3) Flax

(4) Silk

(b) Methods of preparing

(1) Spinning

(2) Weaving

(3) Dyeing

(4) Printing

(c) Adaptability to purposes

2. Making

(a) Cutting and fitting

(b) Hand sewing

(c) Machine sewing

(d) Embroidery, fancy work

3. Patching and darning

III. HOUSEHOLD ECONOMICS

1. Sanitation

(a) Drainage

(b) Water supply

(c) Plumbing

(d) Warming and ventilating

(e) Cleanliness

2. Furnishing

(a) Decorations

(1) Color schemes

(2) Materials

(b) Ornaments

(c) Articles of furniture

3. Care of the house

(a) Care of the floors

(b) Dusting

(c) Dish-washing

(d) Bed-making

IV. CARE OF PERSON

1. Care of clothing

2. Bathing

3. Care of teeth, nails, hair.

as full of dust as the streak in which we can see it. But we really know that such is the case. Dust contains particles of matter from the body and the breath, and cannot fail to injure those by whom it is breathed. Even what we call "clean dust" has a very irritating effect on the lining of the nose and throat, and the so-called "dust catarrh" is common. It stands to reason that little is accomplished by dusting with a dry cloth. The dust is merely stirred up, transferred from the furniture to the air. A dampened or oiled cloth should be used, or a damp chamouis skin; and the dust should be gathered up instead of being brushed off. The inexpensive vacuum cleaners have done much to aid in getting rid of the injurious dust.

Insect Pests. Of late years we understand more clearly what a great amount of harm comes from the insect pests which are so troublesome to almost every housekeeper. Bedbugs have always been detested, and roaches have been treated as real enemies to the household; the common fly has always been looked upon simply as a nuisance but not particularly as a menace. It is likely, however, that more injury is done by flies in the household than by any other insect, because they are so much more numerous and because housekeepers who would not tolerate roaches or bugs of any sort put up with flies. When we consider where flies spend much of their time, about the refuse heaps and garbage cans and stables where their eggs are laid, it is clear that they must carry about on their feet much filth. In the house they alight instantly on any food that is left about uncovered, thus leaving the germs where they are certain to be taken into the stomach. That typhoid fever is spread by flies is not a proved fact, but it is positive that some diseases are so carried. It is not an easy matter to get rid of flies, but it can be done. Every opening should be closely screened, and the greatest care should be exercised when the screen doors are opened. Whenever a fly is seen indoors it should be killed.

Mosquitoes, too, are known to be carriers of disease, notably yellow fever. We are, however, not in quite so much danger from mosquitoes as from flies, for mosquitoes are such a pest that nobody is likely to allow them to remain in a house if it is at all avoidable. It is to be hoped that the

Questions

What is the meaning of the word *domestic*?

What advantage came to housewives when no longer obliged to make "homespun" cloths for family clothing?

Does the fact that women to-day take more time for recreation than formerly necessarily indicate that any household duties are neglected?

Is it economical for the average family to patronize bakeries and delicatessen stores? What has occasioned the popular demand for these institutions?

In your opinion does the household conducted according to the teachings of domestic science find its expense increased beyond the sum needed previous to the introduction of scientific housekeeping?

Can one learn from a non-scientific volume the various desirable combinations of food, with respect to chemical needs?

What mineral substance is most essential to life? Does this mineral supply energy? What is its main function?

Learn the meaning of albuminoids, then make a list of foods containing albumin.

What proportion of food should be albuminoids?

Is coffee a food? In what respects do you consider it a useful beverage?

How can you determine whether your well water is nominally pure?

Is the law a proper one which banishes public drinking cups?

Explain carefully why milk is an excellent food. If not a perfect article of food, what does it lack? In saying that an article is a perfect food what do you understand by the statement?

What chemical changes occur in boiling a potato?

Is an egg hard-boiled or soft-boiled more easily digested?

What should be the appearance of a satisfactory cut of beef-steak?

What is a fireless cooker? Upon what principle is it constructed?

time will come when a housekeeper will be as much ashamed to have flies or mosquitoes seen about the house as she is now to have bugs or cockroaches.

Ventilation. This is a subject which is receiving so much attention now that at times we grow almost tired of it, and wish the discussion would cease. Despite that fact, we all realize, to a certain extent, its importance; it is doubtful whether many of us who have not given the subject definite study do really understand how serious it is. We content ourselves with the general knowledge that everyone needs fresh air to keep in good health, and do not go further into the question. It is safe to say that the most of us do not have enough fresh air through the greater part of the day.

Too much cannot be said, at the outset, on the need for fresh air during sleeping hours. It is believed now by most authorities that the ideal way is to sleep out-of-doors in all but the most severe weather; some people remain out all winter, taking care, of course, to have clothing and bedding which is as light as possible, but warm, for there is no merit to be gained from getting cold at night. If we cannot sleep out-of-doors, the next best thing is to make the sleeping room as near like out-of-doors as possible. There are people who even in hot weather have their bedroom windows raised but a few inches, held so, perhaps, by a burglar catch; but if windows are to be opened but a little, it is almost safer to have it be in the summer than in the winter. For in the winter the house has been closed during the day, and the air has been vitiated by the artificial heat and by the breath and bodily impurities of people, who are much more likely to remain in the house in the winter than in the summer. It is a safe rule to make that a bedroom window should almost always be wide open; of course there are times when a high wind or a storm makes this impossible. A bed should not, however, stand directly in a draught, though no harm can come from allowing a breeze to blow into the face.

But when we have made our sleeping conditions as nearly ideal as possible we have done by no means all, for we spend but about a third of our time in sleep. In some carefully built modern homes there are devices which provide for ventilation mechanically; but unless there is such a system which brings air into the house there is no way to get

fresh air except to open doors and windows. Even in the coldest weather the house should be thoroughly aired at least once a day, and there should be some opening which constantly allows air to come into the house.

The latest authorities declare that it is not enough to have outside air admitted—that that provides only one element. The other element needed is moisture. You have noticed that when you go into a hot, dry room your eyes smart and burn. This is because the dry air, constantly seeking to become less dry, takes up the moisture which protects your eyeballs. It does the same to the lining of the nose and mouth. Now the moisture exists in those membranes for protective reasons, and harm is certain to come from its drying up. These authorities plead for moisture in the air. Keep water on the stove at a boiling point, they advise, and colds and catarrh will certainly be lessened. Then, too, when the air is kept full of moisture, the temperature may be lower than when the air is dry without causing discomfort. A room kept at 60° Fahrenheit would ordinarily be considered too cold; but when the air is moist, 60° is quite comfortable. There is an instrument called the hygrometer which measures and records the amount of moisture which is present in the air.

Related Articles. Consult the following titles for additional information

Adulteration	Furniture
Bread	Heating and Ventilation
Butter	Hygiene
Candy Making	Milk
Canning	Physical Culture
Child Training	Pure Food Laws
Cookery	Thrift
Embroidery	Ventilation
Fireless Cooker	

DOMINICA, *doh-ma ne'kah*, a British West India island, a member of the united colony of the Leeward Islands, between Martinique and Guadeloupe. It covers an area of 281 square miles. It is rugged and mountainous, but it contains many fertile valleys and is well watered. Vegetables, spices, fruits, coffee and cacao are the chief products. The shores are but little indented and are entirely without harbors, but on the west side there are several good anchorages and bays. Roseau is the capital. The ownership of Dominica alternated between France and Great Britain until 1814. Population in 1933, 45,240.

DOMINICAN, *doh-min'i kan*, **REPUB-LIC**. See **SANTO DOMINGO**.

DOMINICANS, an Order of preaching friars, founded in 1215 by Saint Dominic, who wished thereby to increase the influence of the Church. He obtained confirmation for his order from Pope Honorius III in 1216, and this gave the friars the right to preach and to hear confessions wherever they went. The members are bound by vows of chastity, poverty and obedience, are forbidden ever to eat meat, are under obligation to rise at midnight for prayer. They have been displaced in part by the Jesuits. They were known in France as *Jacobins*, in England as *Black Friars*, from the black cloak and hood they wore. Four of the Popes have come from the Order, and of famous painters Fra Angelico and Fra Bartolommeo. Thomas Aquinas and Albertus Magnus were Dominicans. As they were fierce defenders of Church dogma, some member of the Order usually conducted the Spanish Inquisition (which see).

DOMINION DAY, one of Canada's most important holidays, commemorating the confederation of the provinces into the Dominion of Canada under the British North America Act of 1867. The Dominion came into existence on July 1 of that year, and each year on that day the anniversary is celebrated. See **BRITISH NORTH AMERICA ACT**.

DOMINOES, *dom'in oze*, a game played with small, flat, rectangular pieces of ivory, about twice as long as they are broad. Each piece is divided in the middle by a line, and each of the squares thus made is blank or marked by dots, from one to six or twelve in number. When one player leads by laying down a domino, the next must follow by placing alongside of it another, which has the same number of spots on one of its sides. Thus, if the first player lays down 6-4, the second may reply with 4-8, or 6-7, in the former case he must turn in the 4, placing it beside the 4 of the first domino, so that the numbers remaining out will be 6-8; in the latter case he must turn in the 6 to the 6 in like manner, leaving 4-7, to which his opponent must now respond. The player who cannot follow suit loses his turn, and the object of the game is to get rid of all the dominoes in hand, or to hold fewer spots than an opponent when the game is exhausted by neither being able to play. Other games with different styles of counting are played with dominoes. The game was first

played in Europe, in the middle of the eighteenth century.

DOMITIAN, *domish'ean* (51-96), a Roman emperor, son of Vespasian. He succeeded his brother Titus in the year 81. He began his rule with a show of moderation and justice, but lapsed into the sort of cruelty and excess for which his youth had been notorious. He was assassinated.

DON (ancient Tanais), a river of Russia, which issues from Lake Ivan-Ozero, about 150 miles south of Moscow and flows south-east to within thirty-seven miles of the Volga, where it turns abruptly and flows southwest for 236 miles and empties into the Sea of Azov. Its length is nearly 1,150 miles. The chief tributaries are the Donetz, the Voronej, the Khoper and the Mamtsch. The Don carries a large traffic, especially during the spring flood. A canal connects it with the Volga system of navigation. It has extensive fisheries.

DONATELLO, or **DONATO**, *do nah'to*, (1386?-1466), an Italian sculptor, one of the most famous of the early Renaissance and one of the greatest of all time. He was born at Florence and was brought up in the home of Martelli, a wealthy relative. Early he became associated with Brunelleschi, the architect, from whom he gained much encouragement and help. In 1403 both went to Rome and studied there together for two years. Donatello then returned to Florence. His first great works were *Saint Peter* and *Saint Mark*, in the Church of Saint Michael in Florence. In 1433 Donatello returned to Rome, and the works produced during the period immediately following show to a great extent the influence of classical art on his work. The next year he returned to Florence and was employed by his friend and patron Cosmo de Medici, for whom he designed a beautiful bronze statue, *David*, his best-known work. In 1444 he went to Padua and there produced a bronze equestrian statue of Erasmo de Narni, called *Gattamelata*, his greatest work. After visiting Venice, Ferrara and other cities, he returned to Florence in 1457 and passed the rest of his life there.

The distinguishing features of his art are realism and originality. He was the most revolutionary of artists, and though he closely followed antique models, his productions are not imitations, but are original and true to nature. His influence affected

the sculpture of Florence throughout the fifteenth century, up to the time of Michelangelo.

DONGOLA, a province of Anglo-Egyptian Sudan, under control of the British, lying on both sides of the Nile River, south of Egypt proper. There are about 55,000 natives, who raise wheat and dates. There is railroad connection north into Egypt and to the Red Sea.

DONIZETTI, GAETANO (1797-1848), a famous Italian composer. In 1835 he produced the operas *Lucia di Lammermoor* and *Lucrezia Borgia*, both emphatically successful, the first of which is considered his masterpiece. In the same year he removed to Paris, where he afterwards wrote and produced several operas, *Les Martyrs*, *La Favorita*, *Linda di Chamounix*, *Don Pasquale* and *La Fille du Regiment*, all of which enjoy permanent popularity.

DON JUAN, *don hwañ*, the hero of a Spanish legend, which seems to have had some historical basis in the life of a member of the noble family of Tenorio at Seville. According to the legend Don Juan was recklessly immoral. An insult to the daughter of a governor of Seville brought the indignant father and the profligate young man into deadly conflict, in which the former was slain. Don Juan afterward, in a spirit of wild mockery, went to the grave of the murdered man and invited his statue to a revel. To the terror of Don Juan, the "stony guest" actually appeared at the table to bear him away to hell. The legend has furnished the subject for many dramas, among them Molière's *Don Juan* and Shadwell's *The Libertine*, and for many operas, the most famous of which is Mozart's *Don Giovanni*. The *Don Juan* of Byron bears no relation to the old story, except in the character of the hero.

DONKEY, the name given to the ass when domesticated. See **ASS**.

DONNELLY, IGNATIUS (1831-1901), an American journalist and politician. He studied law, was admitted to the bar and in 1856 went to Minnesota, where he was three years later elected lieutenant-governor. From 1863 to 1869 he was in the House of Representatives, for many years he was in the state legislature and twice he was nominated for Vice-President of the United States by the People's party. Among his writings the one which attracted most at-

tention was *The Great Cryptogram*, which attempted to prove, by means of a word-cipher, that Bacon wrote Shakespeare's plays.

DON QUIXOTE, *don ke ho'tay*, a famous Spanish novel by Cervantes. The book was written to ridicule the absurd notions of knight errantry current in the sixteenth century. Don Quixote, the hero, accompanied on his travels by his servant Sancho Panza, tries to create romance out of the most commonplace situations and consequently becomes involved in all sorts of trouble. Besides being a parody on the chivalry of the time, the book is a brilliant satire on human nature. See **CERVANTES**, MIGUEL DE.

DORÉ, *do'ra'*, PAUL GUSTAVE (1833-1883), a prolific French draftsman and painter, born at Strassburg. He distinguished himself as an illustrator of books. His illustrations of Rabelais, of Perrault's *Tales*, Sue's *Wandering Jew*, Dante's *Divina Commedia* and Cervantes's *Don Quixote* acquired for him a European reputation. Doré's pictures are especially interesting because of the fertility of invention and dramatic instinct revealed in them. His symbolic landscapes enhance the dramatic effect of his scenes. His illustrations of the Bible are among the most widely known of his works.

DORIANS, one of the four great branches of the Greek nation. They migrated from Thessaly southward in the twelfth or eleventh century B C, settling for a time in the mountainous district of Doris, in Northern Greece, and finally in the Peloponnesus. Their chief representatives of the historic era were the Spartans.

DORIC ORDER. See **COLUMN**.

DORMER WINDOW, a window set in the gable of a sloping roof, the frame being nearly vertical to the rafters. It was an important feature in early Gothic architecture and in the later Renaissance. See **GABLE**.

DORMOUSE, a small rodent, common in Europe, resembling the squirrel in its habits and its hairy tail. These little animals inhabit temperate and warm countries and subsist entirely on vegetable food. Their pace is a kind of leap, but they have not the



activity of squirrels While feeding, they sit upright and carry the food to the mouth with their paws. The dormice pass the win-



DORMOUSE

ter in a torpid state, reviving only for a short time on a warm, sunny day, when they take a little of their hoarded stores and then relapse into sleep

DORR'S REBELLION, an incident in Rhode Island history in which Thomas Dorr took the leading part As a member of the state legislature (1833-1837) he headed a party for extending the suffrage, which was still restricted, according to the old charter, by a property qualification. Two constitutions were placed before the people for adoption, and that embodying Dorr's reform received a majority of votes, but it was declared illegally adopted Dorr was also elected governor, and his followers attempted to sustain their government by force of arms. The attempt failed, Dorr was convicted of treason and was sentenced to imprisonment for life, but was afterwards pardoned

DORTMUND, *dawrt'moont*, GERMANY, a city of Prussia in the province of Westphalia, situated near the River Ems, seventy-three miles northeast of Cologne Dortmund has rapidly increased in population in recent years, its prosperity being due to its situation upon several important railway systems, to the opening of extensive coal mines in the vicinity and to the active manufacture of iron and steel products and machinery. Population, 1933, 540,500.

DOSTOIEVSKY, *dahs to yef'ske*, FEDOR (1821-1881), one of the most forceful of Russian novelists, probably ranking next to Tolstoi in power and influence. With Tolstoi he raised the realistic novel to its highest plane, with character and the essence of real life more important than plot Dostoiievsky was for three years an army officer, then for his activity in a socialist society was sentenced to Siberian exile, where he remained four years. His *House of the Dead* had his prison experience as a

background, and was one of his most popular books His first novel, *Poor People*, was well received; his second, *The Double*, was criticised because of its literary style Later volumes restored his vogue; the most important of these were *Crime and Punishment*, *The Downtrodden* and *Oppressed*, and *The Brothers Karamazov*.

DOU, or **DOW**, GERARD (1613-1675), an eminent painter of the Dutch school, born at Leyden He studied under Rembrandt and united his master's manner in handling light and shade with the most minute finish and delicacy. His first work consisted chiefly of portraits, but his greatest achievement was in the field of genre painting His scenes of domestic and common life are depicted in a tender and charming style. The best specimens of his are *Woman Sick of the Dropsy*, *The Bible Reader* and *Grocer Woman*.

DOUAI, *doo á*, **BIBLE**, the English translation of the Bible made by divines connected with the English College at Douai, France, and used by English-speaking Catholics The New Testament was published in 1582 at Rheims, the Old, in 1609, at Douai The translation is made from the Vulgate, or Latin version.

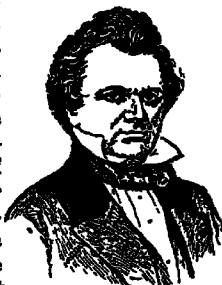
DOUBLE STARS, any pair of stars revolving about a common center It is thought probable that wherever two stars appear very close together in the heavens, they revolve about each other Sometimes a revolution requires centuries, sometimes it requires thousands of years See **ALGOI**

DOUGHERTY, DENNIS J., (1865-), a cardinal of the Roman Catholic Church For a number of years his work centered in the Philippine Islands In 1915 he returned to the United States and was appointed bishop of Buffalo, N. Y. In 1921 he succeeded Cardinal John M. Farley, whose death left this high post vacant

DOUGLAS, STEPHEN ARNOLD (1813-1861), one of the leading statesmen of America of the period leading up to the Civil War Slight of stature, but possessed of superb oratorical powers, he was known universally as the "Little Giant" Though born in Vermont, his career did not begin until he became a citizen of Illinois

In Jacksonville in 1834 he was admitted to the bar. Within a year he became prosecuting attorney for his district He was elected to the lower house of the state legis-

lature in 1836, and in 1841 he was appointed secretary of state for Illinois, but resigned to become judge of the supreme court. Two years later he entered the national House of Representatives, and in 1847 he was chosen United States Senator, which position he filled until his death. He became a leader of the Democratic party, favoring the annexation of Texas, the Mexican War and most of the measures looking toward the extension of slavery. He opposed the Wilmot Proviso, but upheld the compromise of 1850.



STEPHEN A
DOUGLAS

As an advocate of slavery he was careful not to alienate the people of either the North or the South, since it was his ambition to become President of the United States. He therefore introduced into Congress the doctrine known as "popular," or "squatter," sovereignty (see SQUATTER SOVEREIGNTY) which held that to the citizens of each territory belonged the right to determine, through their representatives, whether slavery should be admitted to that territory, but that meanwhile slavery should be allowed. Douglas was therefore the most conspicuous supporter of the Kansas-Nebraska Bill (which see). No single event of the period before the Civil War had greater influence in arousing anti-slavery agitation than this law.

In 1858 Douglas was opposed in his campaign for reelection by Abraham Lincoln, who had risen to prominence in Illinois. During this campaign occurred the famous debates between Lincoln and Douglas, in which the whole problem of slavery and its extension was discussed with remarkable ability by both candidates. Though Douglas was successful, his position on the slavery question cost him the support of the Southern wing of his party in his campaign for the Presidency in 1860. Though nominated by the Northern Democrats, he received only twelve electoral votes, those of Missouri and part of New Jersey. However, he received a popular vote second only to that of Lincoln. When the Civil War broke out, and the issue was between union and secession, he was a strong supporter of President Lincoln.

but died a few months after the beginning of the struggle.

DOUMERGUE, *doo mehrg*, GASTON (1863-), a French statesman who served his country in many important posts, including the Presidency of the republic. His first assignments were to several colonial outposts in subordinate positions; this period ended in 1893. In that year he was elected to the Chamber of Deputies as a radical socialist. In 1902 he entered the Cabinet as Minister of the Colonies, in 1905 was elected vice-president of the Chamber, the next year was in the Cabinet again as Minister of Commerce, then Minister of Education. In his own first Cabinet in 1913 he took for himself the portfolios of Premier and Foreign Minister, when this Cabinet fell two years later, he served under his successor as Minister of the Colonies, a tenure interrupted by appointment on a war mission to Russia. On his return he became a Senator and soon was president of the Senate. In 1924 he was elected President of France, and served the full term, to 1931. Three years later he formed his second, short-lived, Cabinet.

DOUM PALM, *doo'm'palm*, a palm tree, remarkable for having repeatedly-branching stems. Each branch terminates in a tuft of large, fan-shaped leaves. The fruit is about the size of an apple. It has a fibrous, mealy rind, which tastes like gingerbread and is eaten by the poorer inhabitants of Upper Egypt, where the doum palm grows.

DOURO, *do'e ro*, a river of Spain and Portugal, navigable only in the Portuguese part of its course. It rises in the province of Soria, Spain, over a mile above the sea, and after many turns flows southwesterly for sixty miles between Spain and Portugal, and then westward across the latter country, emptying into the Atlantic Ocean three miles west of Oporto. Its entire course is 485 miles. The Douro is used to transport wines from interior Portugal to Oporto.

DOVE, *doo*, a name which scientifically has no distinction from *pigeon*, but which is commonly applied to a few species of pigeons, notably the mourning, ring, scaled and ground doves. Of these the best known is the mourning dove, a member of the family of turtle doves (see TURTLE DOVES). In poetry and in legend the dove has always been the symbol of innocence, gentleness and love, and in the Christian religion it has occupied a prominent position. It was a dove

that Noah sent from the ark; a dove rested on the head of Christ after his baptism, and Saint John "saw the Spirit descending from heaven like a dove" The dove appears in innumerable pictures throughout all periods of Christian art.

DOVER, DEL., the capital of the state and the county seat of Kent County, forty-eight miles south of Wilmington, on the unnavigable Saint Jones River, and on the Pennsylvania railroad. It is in a fruit region and contains fruit-canning and evaporating works, sawmills, foundries and machine shops Wesley Collegiate Institute (a preparatory school) and the State College for Colored Students are located here. The statehouse, the county courthouse and the post office are important buildings, most of them in colonial style Dover was settled in 1717 It was made the capital in 1777 and incorporated as a town in 1829 Population, 1930, 4,800.

DOVER, ENGLAND, an important seaport and trading town in the county of Kent, sixty-seven miles southeast of London It lies on the coast of the Strait of Dover, and is twenty-one miles distant from Calais, the nearest point on the French coast Dover is an important railway terminus, and as a port for mail and packet service with the continent it has a large passenger traffic Shipbuilding, sailmaking and fisheries are the chief industries The harbor has been much improved in recent years, and the entrance is protected by Admiralty Pier, which is nearly half a mile in length. The famous old castle of Dover stands on the celebrated chalk cliffs, 350 feet in height Dover suffered from air raids and bombardment from the sea during the World War Population, 1931, 41,097.

DOVER, N. H., the county seat of Strafford County, ten miles northwest of Portsmouth, on the Cocheco and Bellamy rivers, and on branches of the Boston & Maine railroad There are also interurban lines The river furnishes water power for manufactures, which include machinery, cotton and woolen goods, lumber products, printing presses and shoes The city has a public library, a town hall, an opera house and two hospitals The place was settled in 1623 and is the oldest town in the state; it received its present name in 1639 As a frontier settlement during the seventeenth century, it suffered greatly from Indian attacks. Popu-

lation, 1920, 13,029, in 1930, 13,573, a gain of 4 per cent

DOVER, STRAIT OF, one of the most traversed bodies of water in the world, is a narrow channel between Dover and Calais, which separates Great Britain from the French coast At the narrowest part it is only twenty-one miles wide. The depth of the channel at a medium in the highest spring tides is about 150 feet On both the French and English sides are chalk cliffs, which show a correspondence of strata Great steel nets were stretched across the strait by the British and French during the World War to check the operations of enemy submarines.

DOW, NEAL (1804-1897), an American temperance reformer, born in Portland, Me., of Quaker parentage Maine's prohibition law was drafted by him in 1851 He served twice as mayor of Portland, and one term as assemblyman, and he enlisted in the Union army during the Civil War, being promoted to the rank of brigadier-general After the war he devoted himself to the temperance cause, and was the candidate of the national Prohibition party for President in 1880.

DOWDEN, EDWARD (1843-1913), an English critic, one of the foremost Shakespearean scholars He was born in Cork, Ireland, and educated at Trinity College, Dublin Dowden held successively the positions of professor of oratory and professor of English literature in Trinity College His writings include *Shakspeare: His mind and Art*, *Shakspeare Primer*, *Introduction to Shakspeare*, with editions of the *Sonnets* and of *Hamlet* and *Romeo and Juliet*, critical works on Shelley and Wordsworth and a history of French literature

DOWER, in law, the right of the widow, so long as she lives, to a portion of her deceased husband's property In common law it is one-third of such freehold estates of inheritance as the common issue of the marriage might have inherited In England, Canada and the United States the laws concerning dower have been modified. In some states dower has been entirely abolished

DOWIE, JOHN ALEXANDER (1847-1907), an American religious leader and faith healer, born at Edinburgh, Scotland. He was admitted to the ministry and was pastor of two churches in Sydney, Australia, but later devoted himself to evangelism, traveling in England and America He finally settled in Chicago in 1890 and soon after.

ward organized the Christian Catholic Church, with headquarters at Zion, about forty miles north of Chicago. There he established a publishing house, a bank, a college, many charitable institutions, candy and lace factories and other industries, over all of which, as well as the conduct of his followers, he was dictator. In 1903 a tabernacle was erected at Zion, said to be one of the largest churches in the world. In 1901 Dowio announced himself to be Elijah the Restorer and made plans to extend the influence of Zion's church throughout the world. In 1906, however, a revolt among his followers led to his downfall. He was succeeded by Wilbur G. Voliva.

DOYLE, ARTHUR CONAN, Sir (1859-1930), an English novelist, best known as the author of the Sherlock Holmes detective stories. Doyle studied at Stonyhurst and Edinburgh, and from 1882 to 1890 he practiced medicine at Southsea. The success of some early attempts at fiction led him to give up his profession for a literary career, and he published a great number of very popular books. In 1887 appeared *A Study in Scarlet*, made famous at once by the detective Sherlock Holmes, whom he introduced also into *The Sign of the Four*, *The Adventures of Sherlock Holmes*, *The Memoirs of Sherlock Holmes*, *The Hound of the Baskervilles* and *His Last Bow*. Among his other books are the historical novels *Micah Clarke* and *The White Company*; the volumes of short stories *Round the Red Lamp* and *The Stark Munro Letters*, and *The Great Boer War*. He was knighted in 1902, as a reward for his services during that war and for his defense of the British policy. During the World War Doyle wrote a *History of the Great War*, the third volume of which appeared in 1918. The same year he published *The New Revelation*, and in 1921 appeared *The Vital Message*.



A. CONAN DOYLE

DRACHMA, *drak'ma*, a unit of weight and of money among the ancient Greeks; also, the name of their principal coin, made of silver and worth about 19 cents. As a unit of weight it varied from 56 to 97 grains troy. The same name is given to a mod-

ern Greek coin, exactly equal to the French franc and, approximately to 19 cents. It is divided into 100 *lepta*. The *drachma*, *drām* or *drachm* is the unit of weight in Greece, being exactly equal to the metric gram.

DRA'CO, an Athenian statesman who flourished about 624 B. C. When the citizens of Athens became dissatisfied because they had no written laws to which they could appeal for justice, Draco was appointed to draw up such a code. These first written laws were so merciless that they were said to have been written in blood. Almost every offense was punishable with death. The laws of Draco were replaced later by the constitution of Solon. See **SOLOD**.

DRAFT, a written order, in regular form, which commands one party, called the *drawee*, to pay to another party the *payee*, a certain sum of money on a specified date. The person making the draft is called the *drawer*. A *sight draft* is one payable on presentation; a *time draft*, one payable a specified number of days after presentation. When a time draft reaches the drawee (through a messenger) he writes "Accepted" across its face and signs his name below the word. The draft then becomes in fact a note for him to pay at maturity. A *bank draft* is one issued by a creditor (the drawer) requesting the drawee, the debtor, to pay to a bank, for transmission to the creditor, a sum of money. In such case the banks act as agents.

There is no prescribed legal form of draft, but custom has decreed a style similar to the one in the drawing, which illustrates a common case—a person authorizing a bank to collect a debt or an account about to fall due. The bank's charge for collection and transmission of the money is called *exchange*; it may be paid by the drawee, or by the drawer. (See page 1111).

A draft is one kind of a bill of exchange, (which see). See also **CHECK**, which is a modified form of draft.

DRAFTING. See **CONSCRIPTION**.


DRAG'ON, a name for several species of lizards inhabiting Asia, Africa and South America. The common *flying lizard* is about ten or twelve inches in length, the tail being extremely long in proportion to the body. The sides of the animal are furnished with peculiar extensions of the skin, which form a kind of wings and help to support the ani-

mal in the air when it springs from branch to branch. These lizards feed almost exclusively on insects.

Dragons, in mythology, were fierce, winged beasts like huge lizards, breathing fire and preying on human beings.

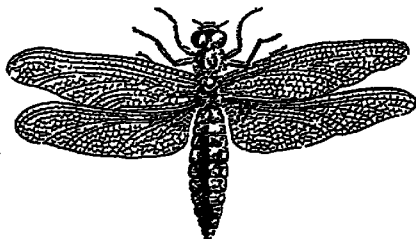
DRAGON FLY, a family of beautiful insects, with large, gauzelike wings, that give it powerful and rapid flight. The dragon fly lays its eggs in the water, where the lar-

roundings are made sanitary by drainage. Successful drainage in a great measure depends on a proper knowledge of the situation and the porosity and character of the various strata of the soil. Some strata allow water to pass through them, while others force it to run or filtrate along their surfaces till it reaches a lower level. In general, where the grounds are in a great measure flat and the soils retain the excess of

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	Denver, Colorado	

COMMON FORM OF BANK DRAFT

vae and pupae live on aquatic insects. The larval stage lasts for a year. The pupae are always hungry. They propel themselves through the water by drawing it into their bodies and throwing it out again. In the United States the dragon fly is known as the *devil's darning needle*, and is the sub-



DRAGON FLY

ject of some childish superstitions, but the dragon flies are harmless insects, and not even the butterflies are more beautiful and graceful.

DRAINAGE, a method of withdrawing the water from the soil by means of channels, which are generally covered. Wet lands are made more productive, swamps and marshes are reclaimed and unhealthy sur-

moisture, they require artificial drainage to render them capable of yielding good crops.

The wetness of land, which makes it inferior for agricultural purposes, may appear not only as surface water, but as water which flows through the lower strata, and in consequence both surface-draining and under-draining are at times necessary. Open ditches carry off the surface water, but they also carry off much of the best soil, so they are not generally used where other methods are available. Stone or tile drains lying four or five feet below the surface are the best medium for agricultural lands. Stone drains are either formed on the plan of open culverts of various forms, or of small stones in sufficient quantity to permit a free and speedy filtration of the water through them. The box drain, for instance, is formed of flat stones neatly arranged in the bottom of the trench, the whole forming an open tube. In tile drains, tiles or pipes of burnt clay form the conduits. They possess all the qualities which are required in the formation of drains affording a free ingress to water, while they effectually exclude vermin, earth and other injurious substances.

Drainage tiles and pipes have been made in a great variety of forms, but all authorities agree that the cylindrical tile is best suited to all conditions. They are manufactured in all diameters up to about two feet.

Sometimes, by placing a few simple drains in the proper places near the sources of springs, swamps of great extent may be quickly dried, while surface drainage of the swamps would be very expensive and only partly successful. Sometimes laws provide for the reclamation of swamp land, partly at the expense of the county in which they are located. In the laying out of drains, the first point to be determined is the place of outfall, which must necessarily be at the lowest point of the land to be drained. The next point to be determined is the position of the minor drains. In the laying out of these, the surface of each field must be regarded as being made up of one or more planes, for each of which the drains should be laid out separately, so that they will run in the line of the greatest slope, no matter how distorted the surface of the field may be. All the minor drains should be made to discharge into mains or submains, and not directly into an open ditch or water course. As a general rule, there should be a main to receive the waters of the minor drains from every five acres.

Great reclamation projects have had for their purpose the draining of vast areas. The most notable instances in recent years has been in connection with the Everglades of Florida (see **EVERGLADES**).

DRAINAGE CANAL, CHICAGO, a canal connecting the south branch of the Chicago River with the Desplaines River at Lockport, Ill. It was constructed for the purpose of turning the sewage of Chicago into the Illinois River. Previous to its construction the sewage had flowed into Lake Michigan, from which the city obtains its water supply. It is considered one of the greatest engineering feats of the century. By its construction the Chicago River, which flowed into Lake Michigan, had its direction reversed, and a powerful current from the lake was sent through its channel to the Illinois River and thence to the Mississippi.

This canal was begun September 3, 1892, and was completed in January, 1900, at a cost of about \$50,000,000. It is a little over twenty-eight miles long and from thirty to

thirty-six feet deep; its width at the bottom in rock sections is 160 feet, and in earth sections from 110 to 202 feet, and at the top it is from 200 to 300 feet wide. The depth of water is never less than twenty-two feet, and the average flow is 300,000 cubic feet a minute, though its capacity is 600,000 cubic feet. The controlling works at Lockport consist of flood gates, a beartrap dam and a tail-race 6,500 feet long. The channel is large enough to carry boats drawing twenty-two feet of water, and with improvements that have since been made in the Illinois and Mississippi rivers the Canal now serves the double purpose of drainage and water transportation between the Great Lakes and the Gulf of Mexico, as part of the Great Inland Waterway system, completed in 1933.

DRAKE, FRANCIS, SIR (1540-1596), an English navigator, famed as the first Englishman to circumnavigate the globe. He served as a sailor in a coasting vessel and afterward joined Sir John Hawkins in his last expedition against the Spaniards (1567), losing nearly all he possessed in that unfortunate enterprise. On the most famous of his voyages **D r a k e** passed the Straits of Magellan, plundered the coasts of Chile and Peru, sacked several ports and captured a Spanish galleon laden with silver, gold and jewels to the value of perhaps \$1,000,000. He then ran north, seeking a passage to the Atlantic, but was compelled to abandon this scheme. He then steered for the Molucca, crossed the Indian Ocean, doubled the Cape of Good Hope and arrived at Plymouth, November 3, 1580, completing a journey around the world. Drake was also one of the heroes of the contest with the Spanish Armada in 1588 (see **ARMADA**).

One of the greatest of frauds centered about a vast estate alleged to have been left by Drake. Adventurers have at times secured millions of dollars from people who were persuaded that they were entitled to large sums from it. No such estate exists, but credulous folks for many years believed themselves heirs to an immense fortune.



**SIR FRANCIS
DRAKE**

DRAKENSBERG, *drah'kens berg*, a range of mountains in Southern Africa, forming the western boundary of Natal and the watershed between the Orange and Limpopo rivers. It is 500 miles in length and has an elevation of from 10,000 to 11,000 feet.



D**RAMA**, *drah'ma*, a prose or poetic work, usually intended to be acted on the stage, in which, by conversation, action and set scenery, incidents and characters are presented in a striking manner. Its two great branches are tragedy and comedy, in a tragedy the plot is of a serious character and the outcome of the play is gloomy, while comedy has a happy ending. Shakespeare's *Macbeth* is a good example of tragedy, and his *Midsummer*

Night's Dream, of comedy. The origin of the drama must be sought for in the love of imitation, and dramatic performances of some kind are to be met with probably among all nations. Dramatic compositions are found in the Old Testament, for example, in *Job* and the *Song of Solomon*; and ancient India and China both developed a dramatic literature of their own.

Recent American Drama. Since the last quarter of the nineteenth century there were produced in America numerous plays by native writers, but comparatively few of high value. One of the most enduring of American comedies is Denman Thompson's classic of rural life, *The Old Homestead*. First produced in 1887, it was played with unflinching success for thirty years. Other playwrights who were active at about the same time include James A. Herne, remembered particularly for his *Shore Acres*, and Bronson Howard, the author of the popular *Shenandoah* and *The Henrietta*. A brilliant and prolific writer, Clyde Fitch (1865-1909), was successful with plays dealing with contemporary society life, another brilliant writer of comedy was George M. Cohan.

Plays of a somewhat serious character, presenting various ethical and social problems, have not been lacking. Examples of this class are *The Easiest Way* and *Fine Feathers*, by Eugene Walter, *Kindling*, by

Charles Kenyon, *Bought and Paid For*, by George Broadhurst, *The Servant in the House*, by Charles Rann Kennedy, and *Salvation Nell*, by Edward Sheldon. Sinclair Lewis achieved one of the greatest of modern successes in *Dodsworth*; Katherine Cornell made Besmer's *The Barretts of Wimpole Street* a great stage success.

The European Drama. This had its origin in Greece, and here both forms, tragedy and comedy, took their rise in the celebrations of the festivals of Bacchus. At these festivals, hymns and chants, either sorrowful or gay in tone, were sung by choruses in honor of the gods, and the chorus continued to be a prominent feature of the old Greek drama. A distinguishing mark of the Greek drama was its adherence to what was known as the unities of time, of place and of action. That is, the events of the play must not extend over more than one day; any change of scene must be slight, no more than what could actually be accomplished in the length of time represented, and all the incidents must bear closely on the one central plot.

The invention of tragedy is generally ascribed to Thespis (about 550 B. C.); but the true creator of tragedy was Aeschylus. Thespis had only one actor, who from time to time relieved the chorus by declamation; Aeschylus changed this representation into real action by making use of two actors in addition to the chorus. He also introduced masks; and by means of a long gown and the *cothurnus*, or buskin, the lofty stature of the heroes was imitated. A third actor was first introduced by Sophocles. Other changes also took place. The chorus, fifty in number, was divided into four groups, and plays were presented in groups of four, founded upon some one legend.

Greek tragedy, at the time of its chief representatives, Aeschylus, Sophocles and Euripides, was rather a religious function than an entertainment. Not only moral, but religious, purposes were evident, and a fear of the justice of the gods was taught by the presentation of the punishment which followed an evil action. Comedy developed side by side with tragedy, but it never attained an equal importance. Largely political in its origin, it held up to ridicule the most prominent men of the day; and from this phase it passed to the ridicule of the foibles of humanity as a whole. The chorus was dropped from the comedy early in its

history. The most important name in connection with Greek comedy is Aristophanes.

The regular drama among the Romans was borrowed from the Greeks. Plautus and Terence were imitators of the Greek comedy, and it is from their translations, rather than from the originals, that we are acquainted with the work of the later Greek writers of comedy. The most important remains of Roman tragedy are the ten dramas accredited to Seneca, which were intended for reading rather than for acting.

In most modern European countries the regular drama took its rise in the mysteries, miracle plays and moralities of the Middle Ages. In Italy, however, it began with a reproduction in Latin of classical models. The earliest tragedy in Italian is Trissino's *Sofonisba* (1515). Regular comedies in Italian were written by Ariosto, Aretino, Maccchiavelli and others; and to the same period (fifteenth and sixteenth centuries) belongs the Italian pastoral drama. The pastorals gave birth to the opera, early masters of which, so far as it may be included in the poetic drama, are Zeno and Metastasio. The Italian drama waned in the seventeenth century, but in the eighteenth century genuine comedy and classic tragedy were restored, the former by Goldoni, the latter by Alfieri. Monti, Manzoni and Niccolini are among the later writers of tragedy.

The other European nations cultivated the dramatic art much later than the Italians. The first English comedy, *Ralph Roister Doister*, was published before 1551, while the first tragedy, *Gorboduc*, or *Ferrex and Porrex*, appeared some years later. The history of the English theater and drama is divided into two parts, the first of which begins with the reign of Elizabeth and ends with the reign of Charles I. The rapid development of the drama during the reign of Elizabeth was entirely unhampered by foreign influence. Lyly, Peele, Greene, Marlowe, Shakespeare, Ben Jonson, Beaumont and Fletcher, Chapman, Webster, Middleton, Marston, Ford and Massinger are among the chief names connected with this brilliant period of the English drama. During the Commonwealth the Puritans prohibited all kinds of plays, and the theaters were shut up for thirteen years. With Charles II the drama reappeared and exhibited a licentiousness hardly equaled by that of any other Christian nation. Among the chief names belonging

to this period are Dryden, Otway, Lee, Shadwell and Wycherley.

From the close of the seventeenth to the end of the eighteenth century, British comedy was cultivated with much success by Cibber, Farquhar, Congreve and others. As most noteworthy among the dramas of this period, however, must be mentioned Addison's *Cato*, Goldsmith's *She Stoops to Conquer* and Sheridan's *The Rivals* and *The School for Scandal*. Some of the famous poets of the nineteenth century, notably Browning, Tennyson and Swinburne, have written dramas, but much of their work is not well adapted for acting. The knowledge of what may be effectively presented on the stage has become clearer in recent years, and most modern plays are written with a view to their dramatic rather than to their literary value. Of the modern British dramatists the most notable include James Barrie, Arthur W. Pinero, Bernard Shaw, Henry Arthur Jones and John Galsworthy.

Cornelle (1606-1684) is looked on as the founder of the drama in France. Racine, Molière, Voltaire, and in later times Hugo, are some of the other distinguished French dramatists. Since about 1820 a new dramatic school has been formed in France, which, departing from the ancient strictness of what is called the classic, approaches more and more to the German or British, or what is called the romantic school. The establishment of this school formed part of the general reaction against the excessive adherence to classic models in literature, the leader in the movement being Victor Hugo. Among the modern French dramatists may be mentioned Alfred de Vigny, Alfred de Musset, Mérimée, Scribe, Dumas the Younger, Sardou and Edmond Rostand.

The German drama is of later birth than any we have mentioned, and for a long time the Germans contented themselves with translations and adaptations from the French. Lessing was the first who, by word and deed, broke the French sway, and he was succeeded by Schiller and Goethe, who rank as the greatest of the modern dramatists. Prominent names in the German drama are Kotzebue, Körner, Schlegel, Tieck, Brentano, Grillparzer, Hebbel, Ludwig, Gutzkow, Freytag, Sudermann and Hauptmann. Ibsen and Björnson are connected with Scandinavian drama, Belgium is represented by the Maeterlinck and Italy by D'Annunzio.

Outline on the Drama

I. FORMS

1 *Tragedy*

- a Subject matter serious or classic
- b Language dignified and graceful.

2 *Comedy*.

- a Less serious than tragedy.
- b Treatment somewhat light throughout

3 *Opera*

4 *Burlesque*

- a Depicts dignified and serious subjects of life in a ludicrous manner, or vice versa
- b Means of satirical criticism

5 *Farce*

- a More extravagant and ludicrous than the comedy

6 *Mysteries*

- a Rude dramas presented at solemn festivals, religious in character.
- b Object—To strengthen Christian Church

7. *Moralties*

- a. Allegorical plays Moral discourses praising virtue and condemning vice

- c Aeschylus, first writer of Greek tragedy.

5 *Rome*

- a Drama borrowed from Greeks. In a sense imitators
- b Became powerful and influenced modern literature more forcibly than did Greece.

6. *Italy*

- a Foundation of the drama as produced by Shakespeare came directly from Italian
- b. Great periods were during fourteenth, fifteenth and sixteenth centuries

7 *France*

- a 1684, early school of dramatic writings flourished.
- b Corneille, Racine and Molière the distinguished dramatists
- c 1820, a new school of art was formed, called the romantic
- d Writers in this school, Sardou, Dumas, Rostand.

8 *Spain*

- a The drama flourished at the same time as the English

9. *England*

- a Last half of the sixteenth century marked the height of the most brilliant period of the English drama Writers — Jonson, Marlowe, Shakespeare
- b Theaters were shut up for thirteen years by Puritans
- c With Charles II the drama reappeared

10 *German*

- a At first merely translations from the French.
- b. Original works appeared later on.
- c Schiller and Goethe greatest of modern dramatists.

II DEVELOPMENT

1. *Old Testament*

- a Job
- b. Songs of Solomon.

2 *India*.

- a. Drama much inferior to Greek or modern European.

3. *China*.

- a Dramatic writing extensive, but unknown to other peoples

4. *Greece*

- a European drama originated in Greece, foremost nation in literature in early times
- b. Dramas at first were celebrations of festivals of Bacchus, god of wine

Related Articles. Consult the following titles for additional information

GENERAL

Burlesque	Midsummer Night's
Camille	Dream
Comedy	Miracle Plays
Comic Opera	Morality Plays
Farce	Mystery
Figaro	Opera
Hamlet	Passion Play
Macbeth	Theater
Masque	Tragedy
Melodrama	

DRAMATISTS

Ade, George	Jonson, Ben
Aeschylus	Lesage, Alain R
Alfieri, Vittorio	Masterlinck, Maurice
Annunzio, Gabrielle d'	Marlowe, Christopher
Aristophanes	Molière
Barrie, James, Sir	Finero, Arthur Wing
Beaumarchais, Pierre	Plautus, Titus M
Augustin Caron de	Racine, Jean
Beaumont, Francis	Rostand, Edmond
and Fletcher, John	Sardou, Victorien
Belasco, David	Schiller, Johann F
Boucicault, Dion	Shakespeare, William
Congreve, William	Shaw, George B
Cornaille, Pierre	Sheridan, Richard B
Dryden, John	Sophocles
Dumas, Alexander	Strinberg, August
Euripides	Suderman, Hermann
Fitch, Clyde	Synge, John Milling-
Galsworthy, John	ton
Gilbert, William S	Terence
Goethe, Johann	Thomas, Augustus
Goldsmith, Oliver	Udall, Nicholas
Halevy, Edouard	Vega, Carpio, Felix
Hauptmann, Gerhart	Lope de
Horne, James A	Yeats, William B
Ibsen, Henrik	

ACTORS

Adams, Maude K	Fiske, Minnie Mad-
Anderson, Marie A	dern
Anglin, Margaret	Forbes-Robertson,
Arthur, Julia	Johnston, Sir
Barrett, Lawrence	Forrest, Edwin
Barrymore (family)	Garrick, David
Bernhardt, Sarah	Gillette, William H
Booth, Edwin Thomas	Goodwin, Nathaniel C
Cohan, George M	Hackett, James K
Coquelin, Benoit C	Horne, James A
Irving, Henry, Sir	Illington, Margaret
Jefferson, Joseph	Nazimova, Alla
Keene, Laura	Rachel
Langtry, Mrs Lillie	Ristori, Adelaid
Manning, Mary	Russell, Lillian
Mansfield, Richard	Salvini, Tommaso
Mantell, Robert	Siddons, Mrs Sarah
Marlowe, Julia	Skinner, Otis
Modjeska, Helena	Sothern, Edward H
Morris, Clara	Terry, Ellen A
Cushman, Charlotte S	Thompson, Denman
Drew, John	Tree, Herbert
Duse, Eleanora	Beerbohm, Sir
Elliott, Maxine	Warfield, David

DRAPER, ANDREW SLOAN (1848-1913), an American educator, born at Westford, New York. He first distinguished himself in the field of politics, serving in the New York legislature and as a member of the Court of Commissioners of the Alabama claims, by appointment of President Arthur. His chief service, however, was in the interest of education. He was largely instrumental in securing the erection at Albany of the educational administration building, one of the most exquisite modern examples of classic Grecian architecture. In 1886 he was elected superintendent of public instruction of New York and retained the position for

six years, when he became superintendent of schools in Cleveland, Ohio. He was president of the University of Illinois from 1894 to 1904, and afterwards was commissioner of education for the state of New York. He was the author of *American Schools and American Citizenship*, *American Universities and the National Life*, and *Organization and Administration of the American School System*.

DRAVE, a European river which rises in Tyrol, flows across the northern part of Illyria and the southern end of Styria, between Hungary on the left and Croatia and Slavonia on the right, and joins the Danube fourteen miles east of Essek. Its chief affluent is the Mur. It is about 450 miles long, and is navigable for about 350 miles.

DRAVIDIAN, a term applied to the vernacular tongues of the great majority of the inhabitants of Southern India and to the people themselves, who must have inhabited India previous to the advent of the Aryans. The Dravidian languages are generally considered to belong to the Turaman class.



DRAWING, the art of representing upon a flat surface the forms of objects and their positions and relations to one another. Drawing is a mode of expression. It is as natural to the child as writing and is used by him long before he learns to write, and in many instances even before he learns to talk. Experienced teachers of drawing claim that were drawing taught with as much care and persistence as language in the primary grades of the public schools, the children would go from these grades as proficient in one mode of expression as in the other.

Importance of Drawing. The practical value of ability to draw even simple objects is almost beyond estimate, let one's occupation be what it may; while to those engaged in the occupations of carpenter, blacksmith or dressmaker, and in other common occupations requiring mechanical skill, a knowledge of drawing is indispensable. Notwithstanding this, how few can draw even the simplest designs. The common expression,

"I can't draw a straight line," is in most cases more real than imaginary. Whoever goes into life without knowing how to draw is handicapped in his ability to express himself. Ability to draw also enables one to make plain many things which cannot be explained by words alone, as the description of a machine or the plan of a house. Moreover, a knowledge of drawing gives a person a knowledge of form and size which enables him to judge machines, tools, houses and other structures more accurately than is possible without such knowledge; it gives him

branches in the courses of study. This does not mean that regular lessons in drawing have not been given, but it does mean that underlying principles have not been presented and drilled upon as they are in the teaching of arithmetic, language and other common branches. Where this is done the children learn to draw as readily as they learn writing, language or other subjects. It is the purpose of the exercises on the following pages to illustrate how drawing can be taught systematically and how anyone who so desires can learn to draw.

Position is the first element of drawing. Every thing must have its place.



an insight into the beauties of form and structure in the various objects of nature—as rocks, flowers, insects, birds and animals, and this contributes much to his enjoyment of the works of creation. From any point of view, the man or woman who can draw has great advantage over one who cannot.

Considering the importance of drawing, we often wonder why so few people are able to draw even the simplest objects, and when we compare the results derived from teaching drawing in the public schools with results from teaching other branches, we find the comparison anything but encouraging. Doubtless the chief reason for the failure to secure good results in drawing lies in the fact that drawing has not been, and in general is not yet, taught as systematically as are the other

Elements of Free-Hand Drawing. The fundamental elements of free-hand drawing are:

Position, or the placing of objects,
Direction, or the surface of objects,
Form, or the shape of objects, and
Proportion, or the size of objects

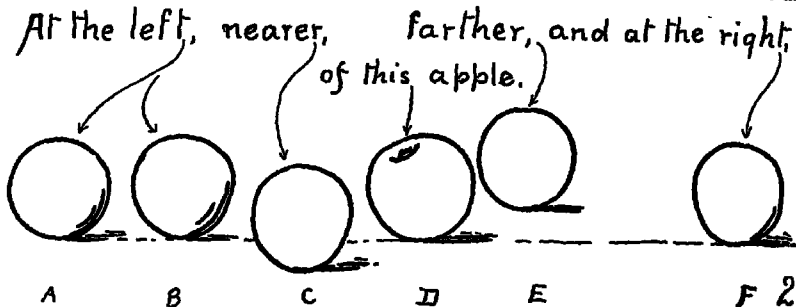
These elements are mechanical and can be taught by all teachers and learned by practically all pupils. They are to drawing somewhat as addition, subtraction, multiplication and division are to numbers. Through them the fundamental processes of drawing are taught and learned.

To these may be added the esthetic element, which in drawing is called the artistic or character element. This element is gained largely through absorption. The artistic can-

not be taught in the direct manner of the mechanical elements, but is gained more slowly as the principle and the mechanical processes are learned. As the fundamental elements or processes are taught, the esthetic element is absorbed to a greater or less de-

If one wishes to learn how to draw the human head, the first lesson would deal with the placing of each part.

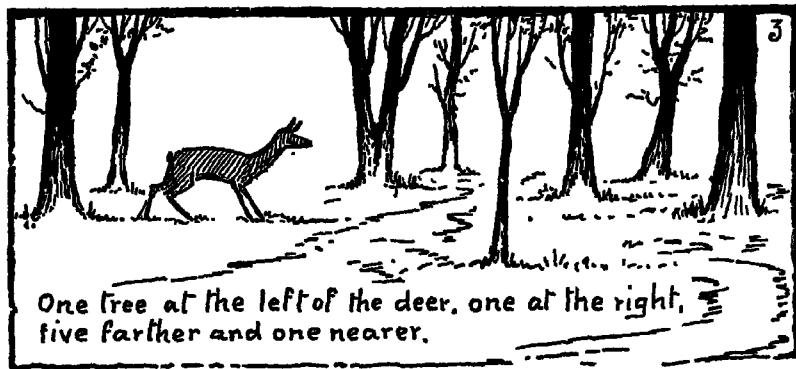
General Principles. In Fig. 2 there are five balls and one apple. Ball F is at the right of the eye. Balls A and B are at the



gree, according to the temperament of the pupils.

Position. Position tells how to place objects in the picture or drawing. From the first, position deals with one object or a part of an object in relation to other objects. If two apples or three balls are drawn, each

left of the apple. The apple and balls A, B and F are the same distance away (back). Therefore: Objects on the same horizontal line are the same distance away. Ball E is farther away than the apple; ball C is nearer than the apple. The farther away the object, the higher it rests in the picture; the



must have its place; and in advancing to higher levels, it is groups of objects and things, groups of animals, groups of boys and girls, forms of hills, dales, plains and trees, which must have their position in the picture. Position includes perspective and composition. *Position* shows how to put objects in a definite place; *perspective*, how to place them different distances away, and *composition*, how to arrange them in a pleasing group. In Fig. 1 each part of the head, eye, nose, mouth, chin, ear and hair has its place.

nearer the object, the lower it rests in the picture.

It will be seen from the above that the element *position* has four principal directions from a given point: To the right, to the left, farther, and nearer than the apple, or any given point.

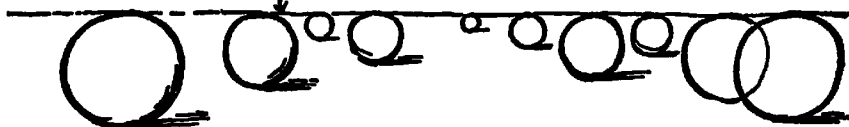
The best objects with which to learn placing are apples and balls. The apple is the center, and the balls are to be placed right, left, farther and nearer, following definite exercises.

Work out such exercises as these. Draw an apple. Place one ball at the right and two farther away. Draw an apple. Place

and apples, pears or other fruit, all make excellent models with which to learn placing Perspective. Perspective is a branch of

These represent balls of the same size if they touch this line.

4



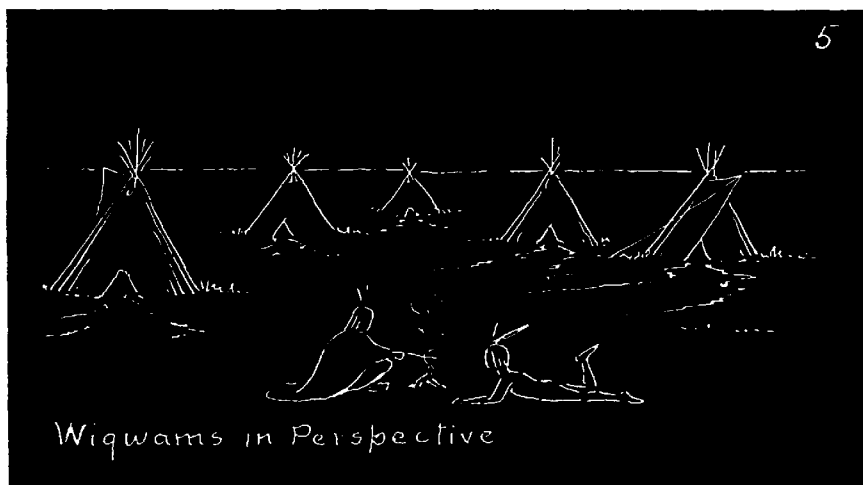
PERSPECTIVE.

one ball at the left, three farther away and one nearer. Work out about twelve exercises of this nature.

Use models Progress is more rapid with models than without. Round objects, such as apples, balls or oranges, may be used.

Position, and tells about representing objects different distances away.

The simplest way of teaching and learning perspective is arbitrarily to represent the top or a definite part of the object as being level with the eye. This level of the



The use of the model is to verify what you learn in the drawing. You need not draw from the model, but use the models to verify or prove your drawing.

After some power is gained in placing the balls and apples, then other objects may be used, as, for example, the deer and trees in Fig. 3. Here the deer takes the place of the apple as a center, and the trees are placed right, left, farther and nearer.

Croquet balls and a stake, one black marble and a number of lighter ones, a tree trunk

eye is indicated by a light horizontal line, as shown in Figs. 4 and 5.

The method gives perfect perspective, and by using it one learns perspective to the extent that objects near and far away can be represented with ease and with a fair degree of accuracy. The process is as follows:

Draw a light horizontal line, as in Fig. 4. This line represents the level of the eye and is called the horizon line

Draw balls of various size, making the upper edge of the balls touch the horizon

line Then it makes no difference how large or how small the balls may be drawn; they are in perfect perspective. The line under the ball indicates the surface of the ground and marks the position of the ball. The balls are in reality the same size, the farther ones being drawn smaller because farther away.

Use heavy lines for the nearer balls and lighter lines for those farther away.

Make the nearest ball about one inch in

zon line and part below. In A, Fig. 6, the tops or foliage part of the trees are drawn above the line and the trunks below. The trunks are of the same length. In B, the main or rectangular part of the houses are drawn below the horizon line, and the roof or triangular part above the line.

In B, the farthest house has a tree at the right of it and one farther away. Objects may be placed at the right, left, farther and



PERSPECTIVE—Place the roofs and tree tops above the horizon line, and the tree trunks and main part of the houses, below.

diameter on paper, and on the blackboard about five inches in diameter.

Use balls when studying a principle. Why? Because balls are easy to represent, and have so little personality that the attention is not attracted to them sufficiently to lose sight of the more important element, principle. But the same principle is applicable to other objects in the same manner as to the balls. In Fig. 5 are wigwams. By placing the top of each even with the horizontal line, perfect perspective is represented.

When drawing tall objects, like trees and houses, part may be placed above the hori-

zon line and part below. In A, Fig. 6, the tops or foliage part of the trees are drawn above the line and the trunks below. The trunks are of the same length. In B, the main or rectangular part of the houses are drawn below the horizon line, and the roof or triangular part above the line.

In B, the farthest house has a tree at the right of it and one farther away. Objects may be placed at the right, left, farther and nearer than a given object, the same as in placing.

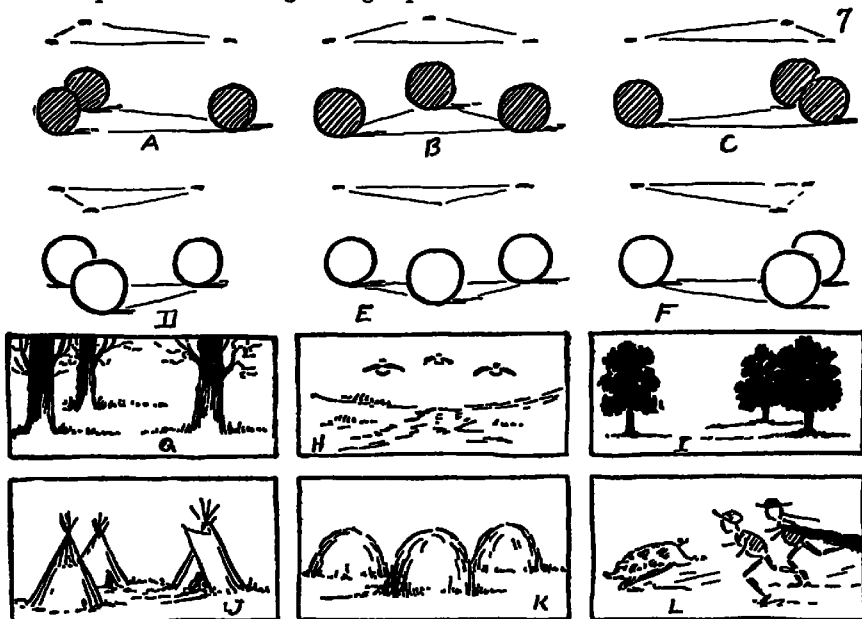
To learn perspective one may draw such exercises as the following: Draw six balls various distances away. Draw five trees various distances away. Draw four houses. Work such exercises as these until you have acquired the skill necessary to represent objects various distances away.

Of course, using the horizon line is a means of learning perspective; in nature objects are not cut by the horizon line like this, but after you have learned how, then the irregularity of nature may be taken into consideration.

Composition. Composition is the arrangement of objects in a pleasing group. The most simple, pleasing arrangement is triangular. In A, Fig. 7, is a triangle and below it are three balls, one on each angle of the triangle, and still lower down, in G, are the trunks of three trees arranged in the same manner. In like manner, B, C, D, E and F show the different arrangement of triangles; under each triangle are the balls grouped in the same manner, and below these is a composition illustrating the group.

Direction is indicated by lines. It is the office of a line to show direction. A vertical line indicates a vertical direction or surface; a horizontal line, a horizontal direction or surface, an oblique line, an oblique direction or surface, and a curved line, a curved direction or surface.

The principal directions that lines may take are, therefore, vertical, horizontal and oblique, and are indicated by the vertical, horizontal and oblique straight and curved lines.



COMPOSITION—A simple grouping of three objects.

Thus, group H corresponds to B; I, to C; J, to D; K, to E; and L, to F.

Grouping may be learned by composing such exercises as these. Make a group of trees based on triangle A, triangle B, triangle C, and so on.

Direction, or the Surface of Objects

Direction. Direction tells about the surface of objects and the various lines that indicate surface.

Direction also indicates action—the action of growth as seen in growing plants; the action of inanimate form as seen in the movements of animals, and the action of rhythm as seen in graceful movements.

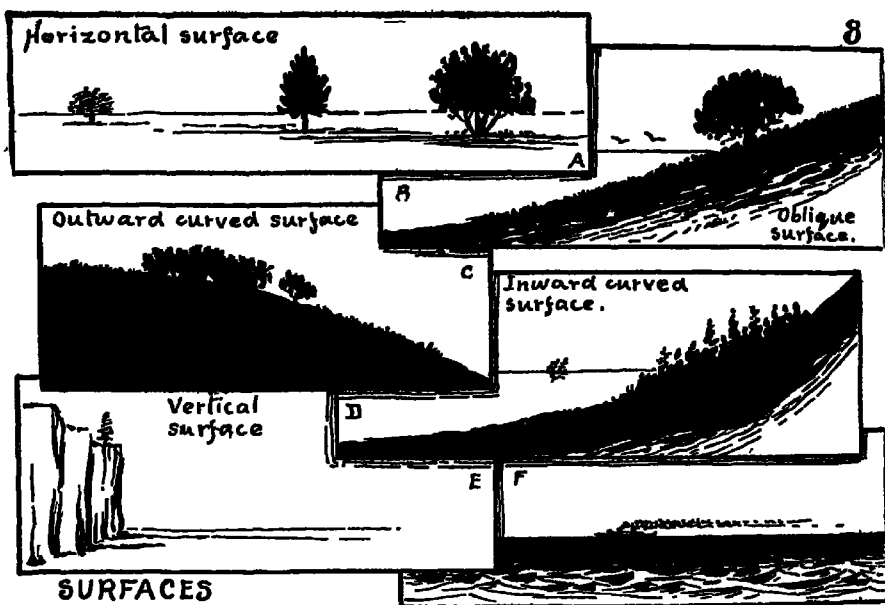
In A, Fig. 8, the trees rest on a horizontal surface indicated by the horizontal lines; also in F the horizontal horizon line suggests the horizontal surface of the water. In B the single tree rests on an oblique surface suggested by the oblique line of the slope. In E the vertical lines of the cliff suggest their vertical surface. C represents an outward curved surface and D an inward curved surface. The representation of surfaces may be learned through such exercises as these: Draw an apple resting on a horizontal surface; on an oblique surface; on an outward curved surface; on an inward curved surface. In like manner represent other objects on the various surfaces.

Lines. In Fig. 10 are shown the lines used in drawing. Of the above lines, the first group, the unaccented lines, are learned first. These should be learned before the accented group is taught at all. In general, use the heavy lines in the placing of objects, and the light and medium lines in perspective.

The *graded line* is the most important line

of stone, or the bark on tree trunks. Both the broken and emphasized line may be and usually are graded.

All that is truly great comes to us by slow degrees. It is the same in acquiring these lines. There is the least character in the unaccented lines, and the most in the accented; hence these latter are more gradually ac-



used in drawing. It is the most rapid, the most serviceable, and the most pleasing of all the lines. This line should be learned, however long it may take, or however great the exertion put forth in learning it. Learn to draw it from light to heavy, or from heavy to light, at pleasure.

In Fig. 11 are examples of the graded line which show how much may be accomplished at each stroke. Observe that the stems are made with a single stroke, and that the joints are represented by a space. Practice these lines until learned.

The *emphasized line* is a line accented by drawing one or more lines parallel and close to it, in such a manner that the general effect is that of one line or direction. Important lines and round surfaces should be emphasized.

The *broken line* is to indicate a broken surface, such as the roughness of ground, the irregularity of grass, the broken appearance

quired, and of these the broken line seems to be the last one to be learned.

The different lines should be learned so well that they can be used at any time and in an almost automatic manner. Lines are the words of the drawing language. If they are not learned, they cannot be used, or if learned imperfectly, their use will be labored and imperfect. Learn these lines, and learn them now.

The birds' nests in Fig. 12 are examples of the broken line. The broken line is learned largely through the copy.

Action Drawing. Action is that part of direction that relates to motion. In a general way direction implies motion, and motion in drawing is largely indicated by lines.

Lines not only express action, but each line has a leading expression of its own that is of vital and far reaching use in action drawing. These expressions are as follows:

Vertical lines are the "still" lines. They

express stillness, but when in motion the express vertical motion, as seen in falling water, rain and snow.

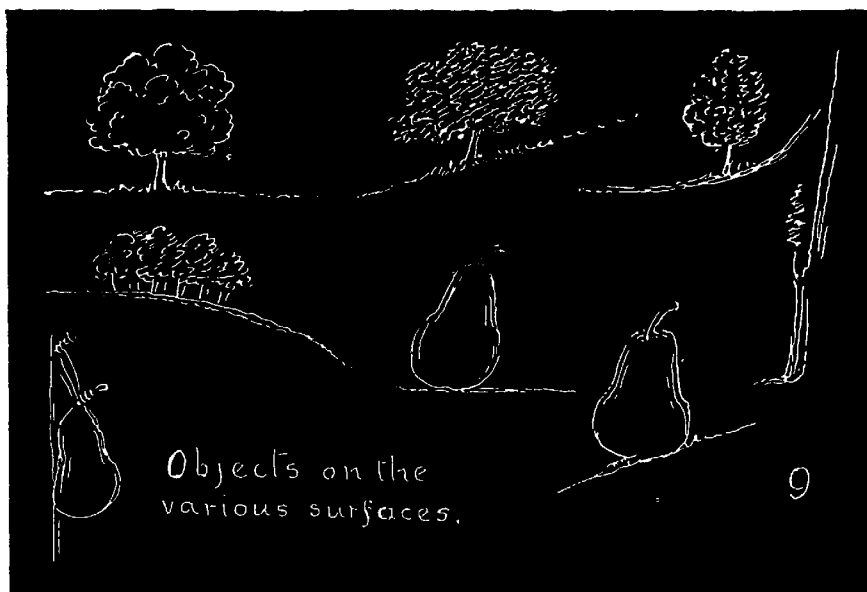
Horizontal lines are the "sleep" lines, and suggest repose; but when in motion they express horizontal motion, as in ripples in still water.

Oblique line are the "go" lines, and ex-

at least, in the learning of action should be from the copy. An excellent plan is as follows:

First: Learn how to express the action from the copy, that is, learn the mechanical process—the lines that represent action and the method of using them.

Second: Use the action thus learned in



press movement more than any other kind of line

Curved lines are the "grace" lines. They express graceful movement and harmonious action

Parallel lines are the "order" lines. They express order. When the hair is combed, the lines are made parallel. Parallel lines when in motion express uniform motion.

Angular lines are "discord" lines. They are the lines of disorder and express violent action, as in explosion; awkward action, as in clumsy movement; and disorder, as in untidy hair

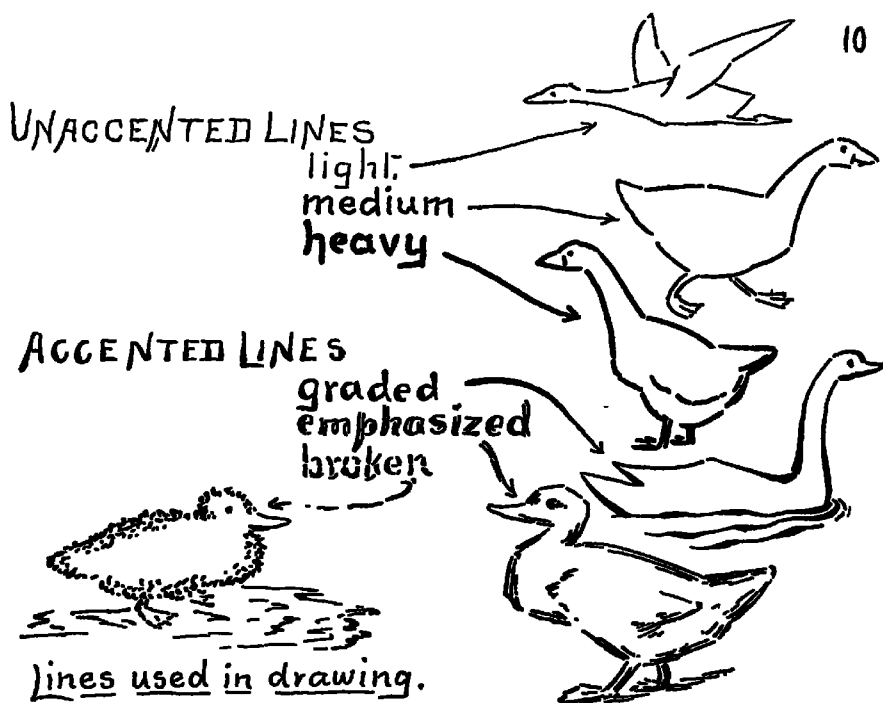
Method of Teaching Action. Action is taught through the copy. It is practically impossible for the average draughtsman to learn action through the object that expresses the action. There is not a movement of an object, or animal, so slow that it can be grasped by a learner to the extent that he can transfer it to paper; hence, first efforts,

memory and imaginative work until the action can be represented with some degree of facility.

Third: Use direct observation to verify, correct and perfect the action until it can be represented with both facility and accuracy. These three steps are not widely separate, but may occur in the same lesson.

For example, we will choose the action of running. There are many phases of running, but perhaps that represented in A, Fig. 14, is as simple as can be made. Learn this action by carefully copying A, and then for practice, draw an Indian boy running, B; then a Chinese boy, C; a sailor boy, D; and a soldier boy, E.

Then take another phase of running, as shown in F. In this phase the knee joint is represented by a space. A space can represent an idea as well as a line. To learn this, first carefully copy the action, then represent a summer boy, F, running; then a



winter boy, G; then a colonial boy, H, and so on until the action is learned.

Action is impersonal, that is, it is not a part of the object that expresses the action. Character belongs to the object, to the individual; character and action we often think are one and the same. The action of running is common to all animals alike, but the character of the run belongs to the individual. For example, the running of a turkey, a goose, a hen, a dog, a cat, and a squirrel are in principle the same, but the character of the run is so different that we recognize each one at a glance.

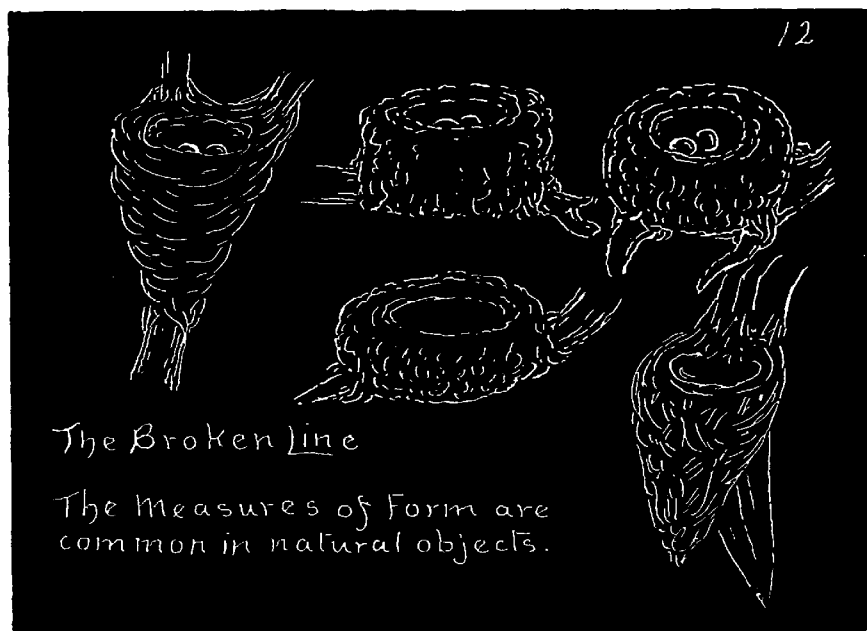
In Fig. 15, A represents the action of running; in C it is applied to an ostrich, in D to a goose, in E to a hen. Then, by taking the two hind legs as one, and the two fore legs as one, the same action is applied to a deer, a horse, a pig and a dog.

Broadly speaking, there are five great groups of action, under which nearly all phases of action may be placed. They are the running group, the walking group, the standing group, the sitting group and the reclining group. Dancing and jumping would be classed under the running group.

In the running and walking groups, the "go," or oblique, lines predominate; in the standing group, the "still," or vertical lines, predominate; in the reclining group the horizontal lines predominate, and in the sitting group the vertical and horizontal lines unite. The "grace," or curved lines, would predominate in dancing, "order," or parallel lines, in the marching of soldiers, and angular lines in a fight.

The Action of Rhythm. Lines not only show direction, and suggest motion, but they may represent rhythm. Rhythm is graceful motion, and in drawing is indicated by graceful lines. All nature is full of rhythm. We see it in the waving grain and bending trees, in the motion of water and the swirl of smoke, in the markings on the feathers of birds, and in the graceful folds of drapery. It is seen in the movements of a kitten and in the color of a lily; it is heard in the call of a lark and in the grand roll of thunder. It is all about us. It is in the graceful or rhythmic motion of sound, color and form.

Rhythm finds its expression in skill, in rhythmic skill. Rhythmic skill is doing things easily, quickly and gracefully. Decorative



The Broken Line

The Measures of Form are common in natural objects.

design is that department of drawing which deals with the ornamentation of form, and has for its basis rhythmic skill.

A good way to acquire rhythmic skill is through two-handed drawing on the black-board. Fig 18 shows the method, and Fig. 17 shows some excellent examples to practice

Decorative Design. Decorative design relates to the ornamentation of form, and the designing of form in which the decorative element is primary. In Fig. 19 are represented the line elements in decorative design.



The Graded line
is the line of Growth

The single and double curves are to modify form, as for example, in Fig. 20. A is a rectangle; in B, C, D, E, F and G, the single curves, both inward and outward, are substituted for the vertical lines of the rectangle; and in I, J, K, L, M and N, the double curves have been substituted.

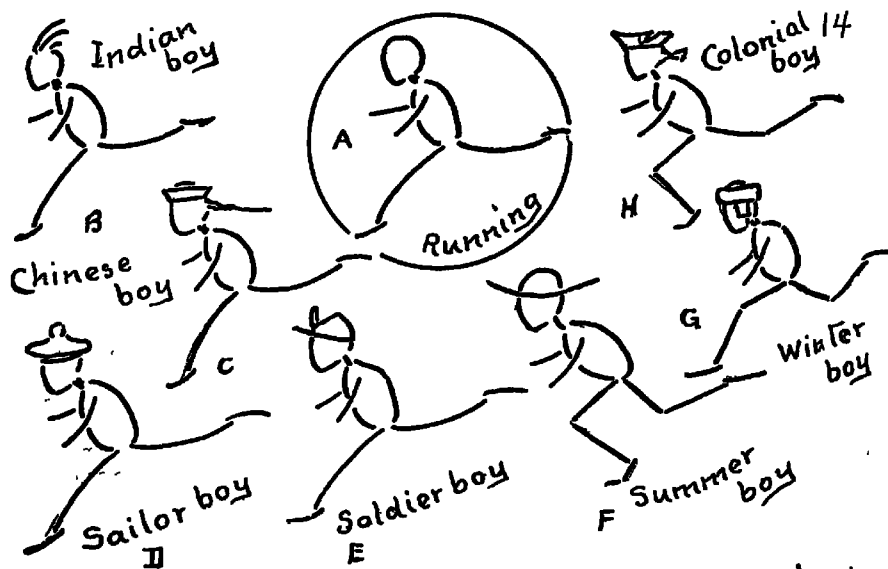
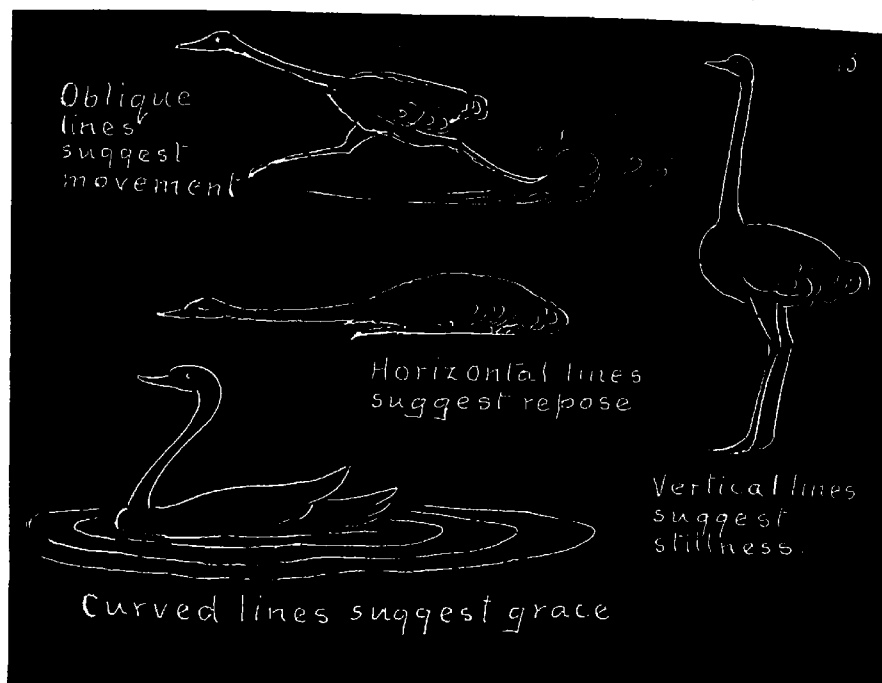
An inward double curve is one that curves in at the top, and an outward double curve is one that curves outward at the top.

O, P, Q, R and S are pitchers made from the above forms

Branching is of two kinds—outward and inward. Outward branching is the branch curving outward from the main stem, as A, Fig. 21. The shorter curve is the branch. Inward branching is the branch curving inward toward the main stem, as B, Fig. 21.

D is an example of inward branching, and all the others are examples of outward branching.

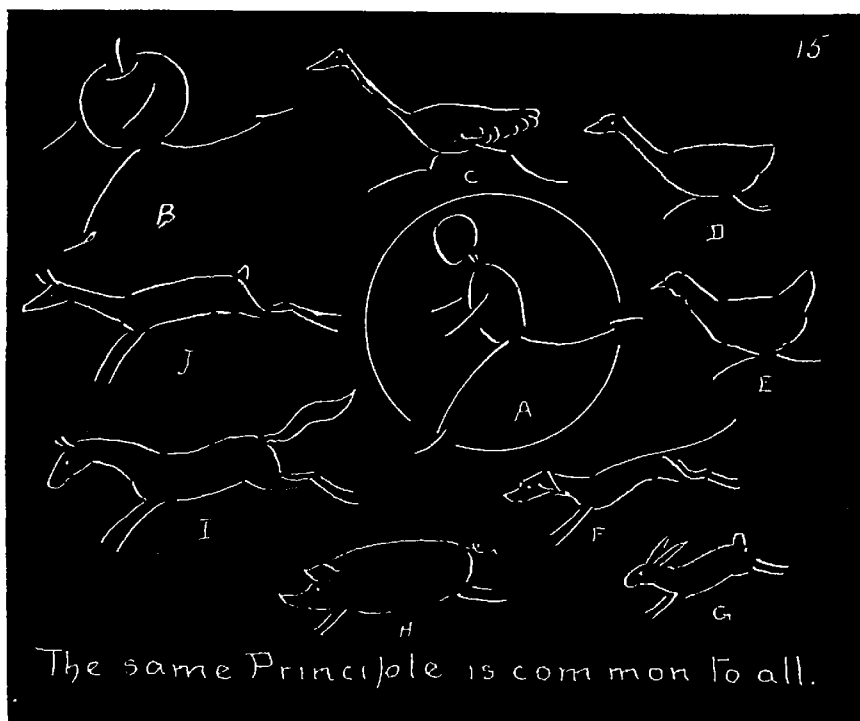
These branching elements are fundamental in character, and are the basis of an infinite number of combinations running through the entire subject of decorative design. To draw these curves and branches



The Action of Running

with facility requires much practice and persistent effort, but so important is it that these elements be acquired, that almost any amount of application and hard work is justifiable

are the same as those used as measures of form. These forms are used in the planning of ornaments, and as form measures in making designs. The use of these forms is



in their acquisition. The designer must acquire the ability to draw these curves and branches with ease, freedom and skill

Fig 22 represents the chief form elements used in decorative design and the three ways of applying them. The geometrical forms

shown in the following discussion on form:

A unit in decorative design is one of the parts used in making the design.

The sources of units are as follows:

The geometrical forms, such as the triangles, rectangles, circles, ellipses and ovals.



Make these birds and animals run, walk, stand, and sleep.

Plant forms such as the branch, stem, leaf, bud, flower, fruit and root of any kind of tree, shrub or plant.

Animate forms, as the head, body, legs, tail and product of all kinds of animals, birds and insects, fish and reptiles.

Natural forms, as water, snow, ice, icicles, waves, running water, smoke, clouds and wind, shells and minerals.

around farther, and the trumpet is formed. Carry it still farther and the whorl is formed. Eliminate the point entirely and the loop is formed. Add to the blade another point and the shoulder is formed.

The names of the standard units are given from a real or fancied resemblance to the object after which they are named.

These units are classic, and therefore universal in their application. They can be applied to centers, borders, bands, flat patterns, covers, supports, or any other form of decoration. They will be used throughout this course; therefore they must be fully memorized. We must know them as a carpenter knows his tools.

The combinations of these standard units are practically unlimited. Their elements enter into nearly every form of decorative design.

They can branch outward, as in A, Fig. 23; branch inward, as B; branch inward with double curves, as D; and outward with double curves, as C. In Fig. 24, the loop

is shown in each of these branchings. Fig. 24 represents the Greek anthemion. The standard units can be combined, as shown in Fig. 25, forming wing units. The first and second rows represent the blade united with each of the standard units. In like manner each standard unit may be united, thus forming endless combinations.

The standard units, the single and double curves with their inward and outward branchings, and the geometrical forms are together a complete set of tools with which

Artificial forms, such as ribbons, flags, streamers, banners, ropes, chains—in fact, any object made by man.

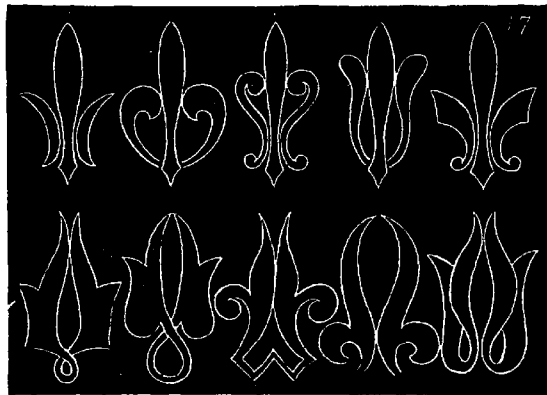
It will be seen from the above that it is quite impossible to give even a superficial list of the units that may be used. Yet, while this is true, there are certain elements common to all decoration that have their origin in the experience of the past, and have been handed down to us as the fruit of successful experience.

These elements, as near as possible, have been reduced to their most simple form in the five standard units, A, Fig. 23. These units are the result of many years of research and study, and include nearly all the elements used in historic ornament and modern decoration.

These units are so fundamental in character that through them we can learn to use any unit or form, however varied or complex it may be.




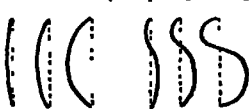



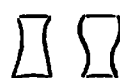
These standard units are very similar in their construction, and have elements that are common. The two main lines of each are examples of outward branching.

Carry the point A of the blade



to work in decorative design. They are decorative words to express decorative thoughts, figures of design to work out problems of ornamentation. They are servants of the mind, and as such the greatest liberty may be taken with them; they may be added

A. The rectangle may be vertical, as in C, or horizontal, as in D. A vertical rectangle is one longer vertically, and a horizontal rectangle is one longer horizontally. Ellipses may be drawn vertically and horizontally, as in E and F. The oval may be

Straight lines are ^{vertical} and ^{horizontal} and oblique.  Curved lines are single or double. 
and are divided into ^{upper} ^{middle} and ^{lower} curves,  each of which
may curve ^{slight} ^{medium} or ^{full}  lines may branch
outward  or inward  curve outward  or
inward  **LINES USED IN DECORATIVE DESIGN**

to, subtracted from, multiplied, divided, or modified in any way the mind may devise. There are no more elements to be given, the list is complete. All that now remains is to make these tools our own until they become willing and obedient instruments in our hands. They have infinite use, and can be applied to all decoration.

Form

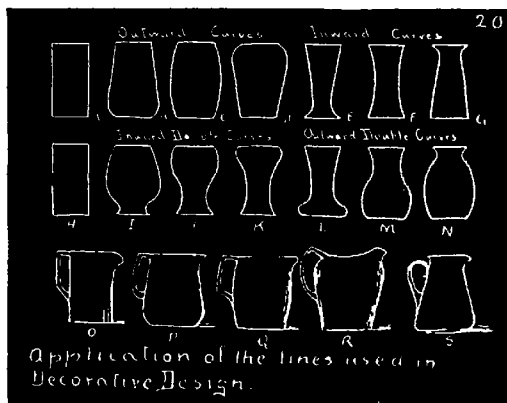
The Measures of Form. Form tells about the shape of objects. The most simple forms that can be seen, recognized and named are the triangles, rectangles, circles, ellipses, and ovals. These forms in mathematics are called geometrical forms, and in drawing, type forms; but a still better name is measures of form, for their use in drawing is to measure form. They are the standards, or measures, of form, very much as a pound is a measure of weight; a gallon, of liquid, or a dollar, a measure of money.

The circle can be modified only in size, but the remaining measures of form may be made narrow, medium and wide, as shown in Fig. 26. The triangle may be drawn with the apex pointing upward or downward, as in

inverted. There are other modifications, but these are the ones mostly used in the measures of form.

Right means *straight*; *acute* means *sharp*; and *obtuse*, *dull*. *Tri* means *three*, hence *triangle* means a *three-angled figure*. *Rectus* means *right*, hence, *rectangle* means a *figure composed of right angles*. *Apex* means *top*; *base*, *bottom*, and *altitude*, *height*.

The uses of measures of form are to aid in recognizing and grasping the shape and proportion of objects, to the extent that they



can be reproduced in drawing. They also aid in making complicated objects simple and easy to grasp as a unit. These geometrical forms are measures of form in the sense that we recognize other and more complicated

test combines them in endless variety and ever changing proportion; the engineer in his greatest works and most complicated problems never departs from the simplicity of these form measures. The carpenter, the blacksmith, the cabinetmaker, the tailor, the dressmaker, artist and artisan, from the designer of the greatest skyscrapers to the humble workman who digs the foundation, base their work on these simple fundamental forms.



forms through their aid. These measures of form are common in all form, both natural and artificial. We see them in the shape of trees, plants and shrubs; of leaf, bud, flower and fruit; in the shape of bird, animal and reptile, and in what they make. The hills and dales, forms of water, great clouds, the broad masses of light and shade, are all full of these simple form measures. The archi-

In Fig. 28 the forms are used in designing a pitcher. In like manner they could be used in designing any other object.

Drawing the Measures of Form. A measure of form to be used must be thoroughly learned—learned so well that it can be drawn easily and quickly. The best way to learn these forms is to draw them.

All measures of form should be drawn with

The principal geometrical forms are  22

The Standard Units are  Units may be modified in

width to narrow, medium and broad  in height to

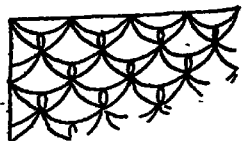
upper, middle and lower divisions,  and by substituting the

curved lines.  Decorative design is applied as Centers 

as Bands and Borders



and as Flat pattern.

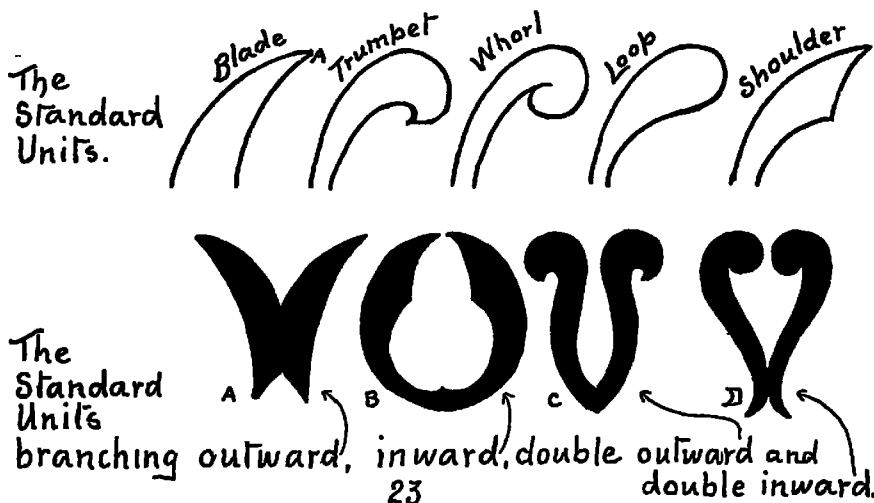


FORM IN DECORATIVE DESIGN:

light lines—with sketch lines. These forms are not an end in themselves but merely a means to an end, and for that reason should be drawn so lightly that it will not be necessary to erase them in the completed drawing.

more and more accurate until crowned with success.

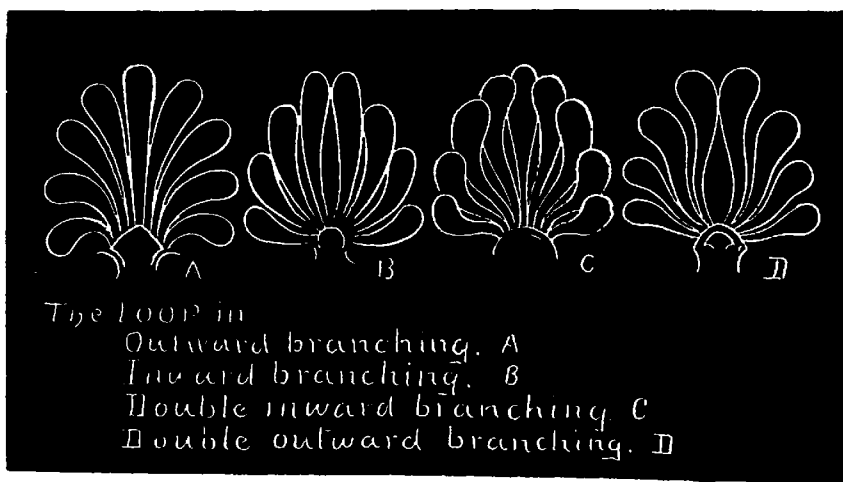
Draw the measures of form about two or three inches long on paper, and from fourteen to twenty inches on the blackboard.



Draw these form measures offhand, without the aid of ruler or compass, and with the minimum of guide lines, dots and other devices. Draw the ellipses, ovals and circles without aid of any sort. It can be done. At first the results are discouraging, but as the student gains in power and acquires the swing of the lines, his efforts become

When turning these measures of form into other objects, use a full range of line. Use all or as many of the lines in Fig. 10 as is necessary. The test of knowing these forms is the ability to draw them and use them as measures of form—to use them as measures of the great world of form.

An excellent way to learn these forms is to



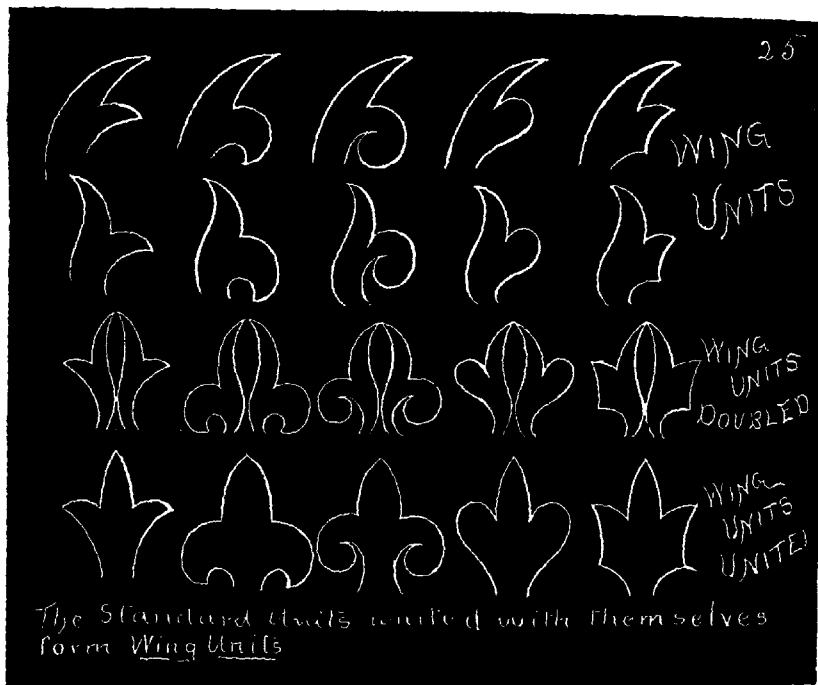
use them as measures of other forms. For example, procure a palm leaf fan; study it, draw it until you have learned how to represent it, then draw fans shaped like the various form measures. Do the same with a padlock, a pitcher, jug, teapot, sign board, and similar objects.

The Chief Measures of Form. The triangle, rectangle and the circle are the most important of the measures of form. By adding the third dimension to these forms,

plication table, so well that they can be used instantly, without confusion or hesitation.

Parallel Drawing

The Rectangular Prism or Box Form. In Fig. 31 are represented the rectangle and the three most important triangles and their prisms. Read from the top downward, and in the first column we have, first, a right angle; then a rectangle; then a rectangular prism; then an oblique rectangular prism,



the prisms are made, giving the triangular prism, the rectangular prism, and the cylinder, which become the measures of solids.

The triangular prism is the form measure for objects containing oblique lines.

The rectangular prism, or box form, is the form measure for square-cornered objects.

The cylinder and the sphere are the form measures for objects containing curved lines.

In these form measures are represented the mechanical elements of drawing, and are the form basis of a vast range of objects that more or less embrace all form. These measures of form must be learned thoroughly; we must know them as we know the multi-

showing the order of origin and the order in which they should be studied.

Parallel drawing, or as it is often called, parallel perspective, is represented by row C. *Parallel drawing* is representing objects with the front face parallel with the surface on which the drawing is made. This surface is called the picture plane.

Oblique drawing, or oblique perspective, is represented when the object is drawn at an angle with the surface on which the drawing is made.

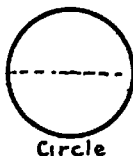
Fig. 32 represents a box with the front face open and toward you. Procure such a pasteboard box and place it on the table

before you in the same position and observe that the box has:

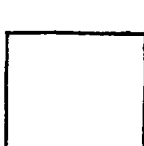
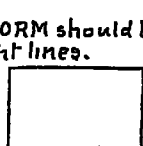
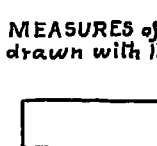
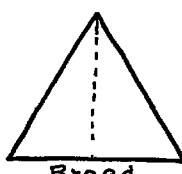
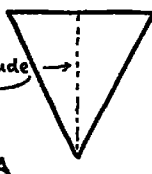
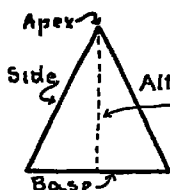
1 Six faces—Top face, bottom face, front face, back face, right face and left face

2 Four vertical edges, four horizontal edges, and four horizontal receding edges.

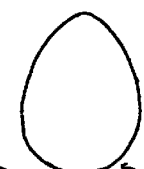
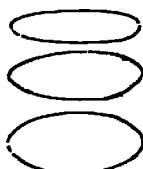
The horizon line represents the level of the eye, and is often called the level-of-the-eye-line. The horizon line is to show whether the top or bottom of objects can be seen. If the object is below this line, the top can be seen, and if above, the bottom can be seen



MEASURES of FORM



MEASURES of FORM should be drawn with light lines.



Vertical Ellipses

Horizontal Ellipses

3 Twelve edges or lines in all. These lines are divided into three sets of four lines each: A set of four vertical lines, a set of four horizontal lines, and a set of four horizontal receding lines. The vertical lines are all drawn parallel with the sides of the paper on which the drawing is made; the horizontal lines parallel with the top and bottom of the paper, and the horizontal receding lines all converge to a point.

The horizontal receding lines converge to a point called the eye-point, or center of vision. This is an imaginary point directly opposite the eye, to which all horizontal receding lines converge.

The horizon line always passes through the center of vision.

The center of vision, or eye-point, shows where the horizontal receding lines converge and also whether the right or left face of objects can be seen.

Observe in Fig. 33:

That the box can be drawn in nine positions.

That when drawn above the level of the eye, the bottom faces can be seen. (Boxes H, C and I)

That when drawn below the level of the eye, the top faces can be seen. (Boxes F, B and G)

That when drawn at the left of the eye, the right faces can be seen. (Boxes H, D and F.)

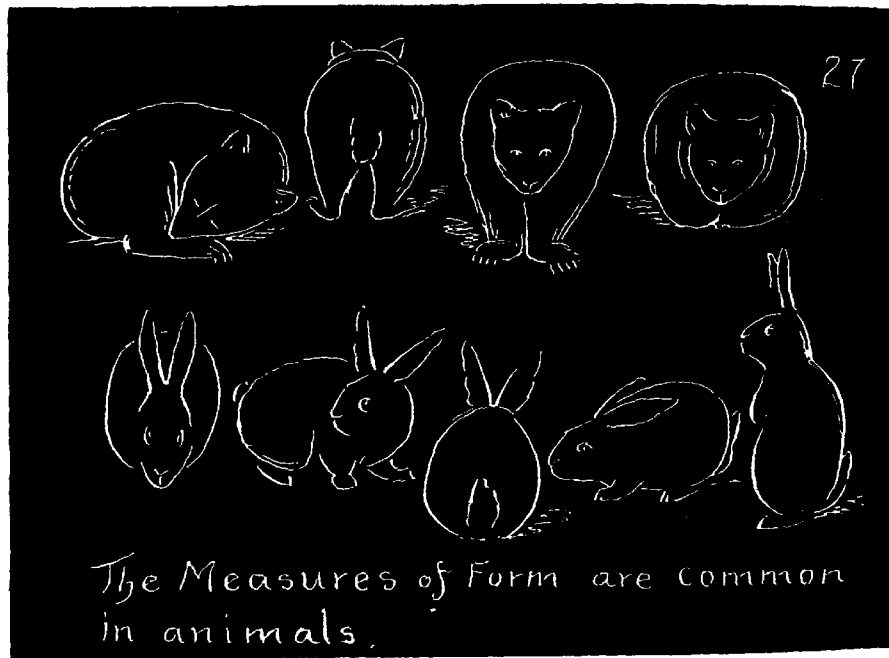
That when drawn at the right of the eye, the left faces can be seen. (Boxes I, E and G.)

That the vertical lines are all drawn parallel with the sides of the paper on which the drawing is made; that the horizontal lines are all drawn parallel with the top and bottom of the paper, and that all the horizontal

Use the model. Compare your drawing with a model, not so much to see if your drawing looks like it as to see if you have the correct principle.

Trees may be introduced into these drawings by placing the top, or foliage part of the tree, above the horizon line, and the trunk below it, as in Fig. 33.

The best way to learn these positions is to draw them. Practice exercises such as these: Draw a box below the eye; above the



receding lines converge to the eye point, or center of vision.

There can be but one center of vision in each drawing.

The box forms are drawn as follows:

- (1) Draw the front face, A, B, C, D, Fig. 34.
- (2) Choose the center of vision.
- (3) Choose the point E and draw the remaining lines.

First make the drawing with a very light sketch line, then finish with heavier lines.

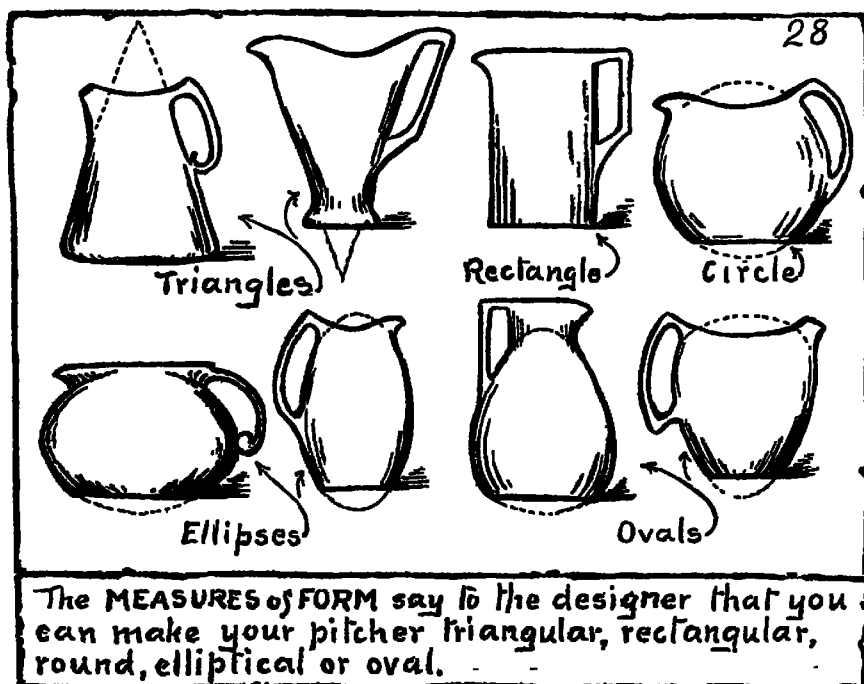
Do not use a ruler or straight edge.

Make the drawings on paper, about $1\frac{1}{2} \times 2\frac{1}{2}$ inches. On the blackboard the drawing should be at least 7×12 inches.

eye; at the right of the eye; at the left of the eye; below and at the left of the eye; above and at the left of the eye, and similar exercises. Introduce trees, balls and similar objects to make a picture effect.

Fig. 35 represents block or box 1 as drawn below the eye, block 2 added to the left face, and block 3 to the right face. In A there is a similar combination. In B there is a box drawn above the eye, and in C, one below and at the left of the eye, with balls placed on each side. In D boxes of all sizes are piled up around the center of vision, and in E there is a box drawn below and at the left of the eye and the front face removed. These are all suggestions on parallel drawing.

28

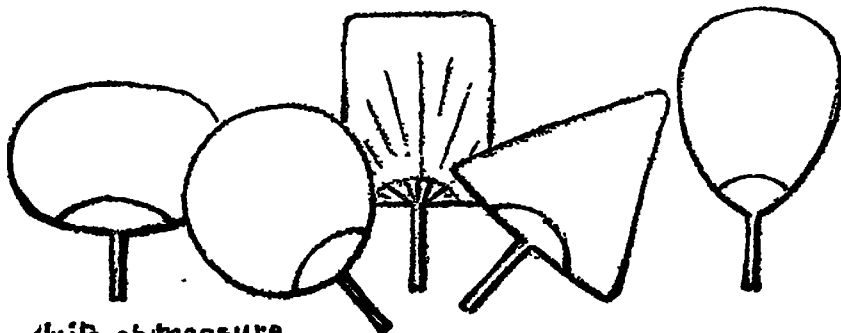


Make arrangement of blocks similar to A. An object above the eye shows the bottom face, and is supposed to be in the air, as the box in B. Place objects, as the balls in C, on various faces. The birds on the blocks in the large drawing are similar in principle to the placing of the balls in C. It is interesting to pile boxes promiscuously, as in D. Remove the various faces from boxes, as suggested in E.

A, B and C, Fig. 36, represent the triangular prisms, which are drawn in the same manner and obey the same principle as the rectangular prism. The rectangular and triangular prisms together make up the principal house forms, as shown in D, E and F. In Fig. 36, D is called a shed roof, and E and F, gable roofs.

These houses may be drawn in all of the positions represented in Fig. 33. A, Fig.

29



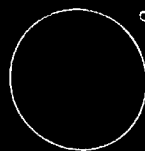
Units of measure used to design Fans.



The Triangle

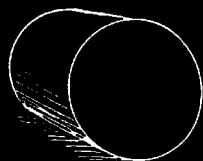


The Rectangle



30

The Circle

The Triangular
prismThe Rectangular
prism

The Cylinder

THE CHIEF MEASURES OF FORM.

Angles.

A



Right angle



Right A.



Acute A.



Obtuse Angle

Forms.

B



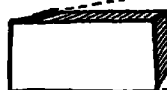
Rectangle.

Right Tri-
angle.Acute
Triangle.

Obtuse Triangle

Parallel
prisms

C

Rectangular
Prism.Right Tri-
angular P.Acute Tri-
angular P.Obtuse Triangu-
lar Prism.Oblique
prisms.

D

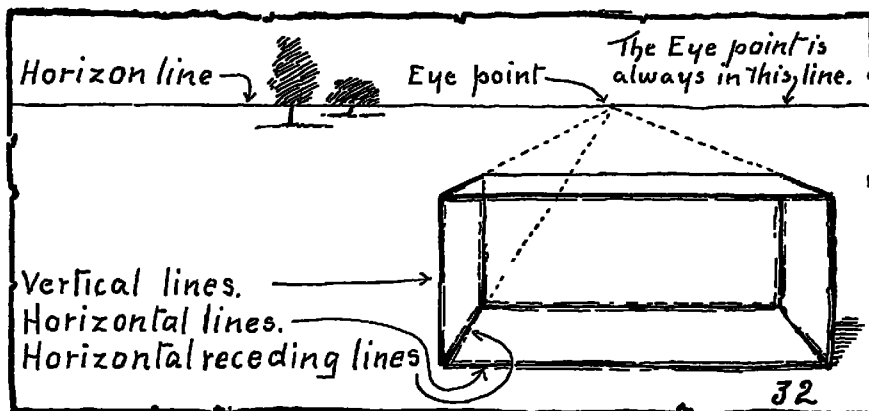
The MEASURES of FORM for Objects containing 3/
straight lines

37, represents a house drawn at the left of the eye, and B, a shed at the right of the eye.

We have studied the angles and forms as shown in Fig. 31, then the prisms in parallel perspective, as shown in the third horizontal row, and now we will study the prisms

and over until it can be drawn with ease and a fair degree of accuracy, for it is the basis of a large class of objects, and if this is learned thoroughly it becomes the basis of the whole class

Place before you a common pasteboard



in oblique position as shown in the last horizontal row. The aim is to show how to draw straight-lined objects in an oblique position, or in oblique perspective, as it is often called.

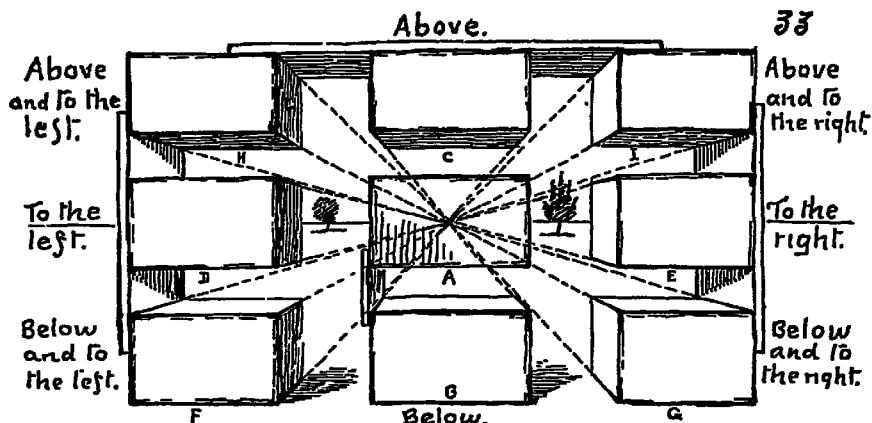
In oblique drawing the center of vision is not the hand, neither are there vanishing points of any kind. The whole dependence is put on the unaided hand and eye.

The rectangular prism, as shown in Fig. 38, is the principal figure. This must be thoroughly learned. It must be drawn over

box in the position of Fig 38, and observe the three sets of lines. AAAA, BBBB and CCCC. The lines of the first set are vertical and parallel. The sets of lines marked B and C are receding and consequently converge slightly, but in the drawing they should not appear to converge, but should appear parallel and natural

Draw the rectangular prism in the order of the numbers, beginning with line 1, then line 2, and so on, as shown in D, Fig 39

The faces are named top, bottom, right



POSITION—The nine positions of the Box.

front, left front, right back and left back.

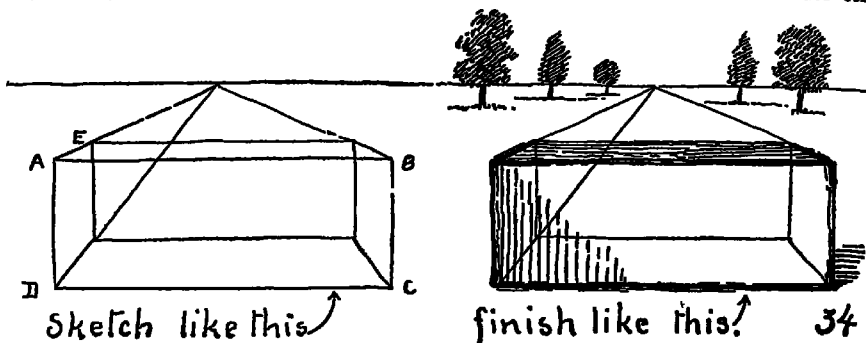
Draw all prisms and objects with light lines, and then finish with heavier.

Draw the receding lines longer than they are to appear in the object, so as to judge more accurately of their correctness.

Fig. 39 represents the principal forms of

tive the triangular prisms A, B and C, Fig. 36, and then draw their applications, as shown in D, E and F. Draw the houses in Fig. 37. Do this until this kind of drawing is learned.

The Cylinder. With the addition of the cylinder, our measures of form are com-



the rectangular prism that may be used in drill work.

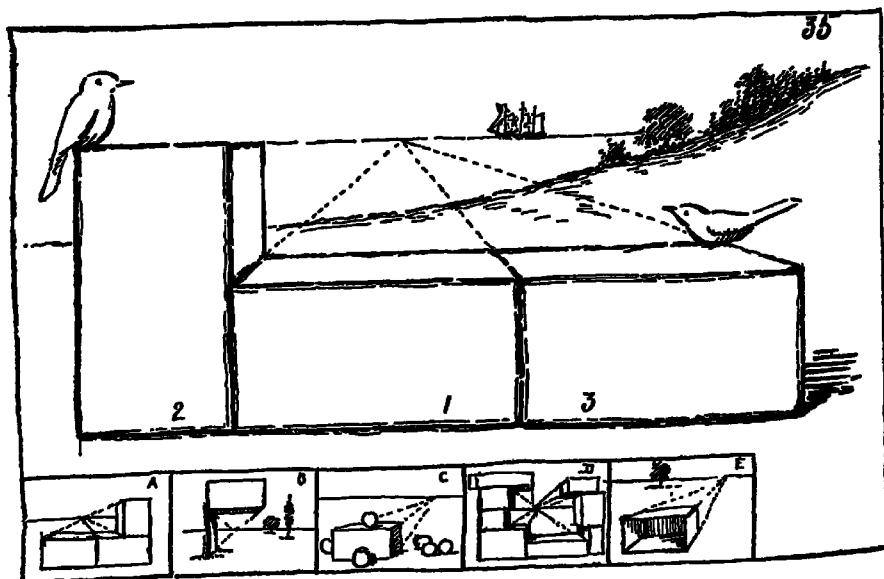
Learn to draw these forms quickly, with ease and a fair degree of accuracy.

The lunch box in Fig. 40 is an application of oblique drawing. All of the drawing in parallel perspective can be drawn in oblique perspective, and that may and should be the drill work in learning this branch.

Draw, for example, in oblique perspec-

plete. The four rows of forms in Fig. 41 represent the mechanical basis of practically all form. These are the measures of form that underlie the arts and crafts, the engineering professions, and the great world of form. These are the basic forms for all making and building, and are common alike in the fashioning of delicate jewelry and the building of a great skyscraper.

The cylinder is the measure of form for

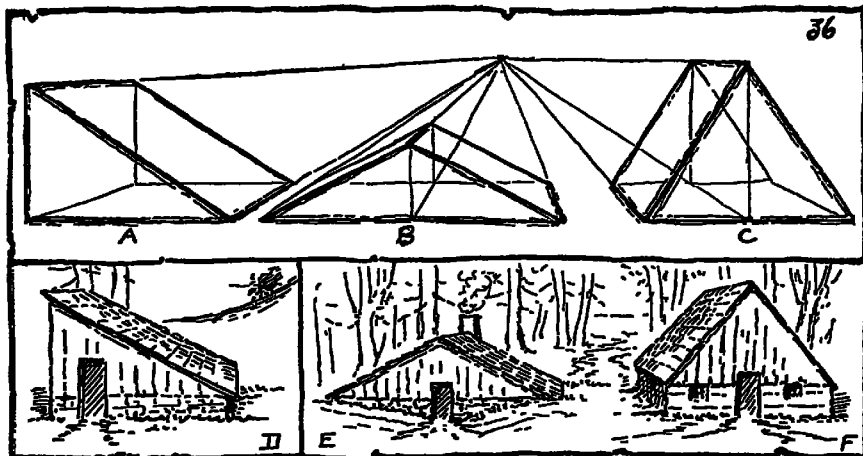


objects having curved lines. It is the mechanical basis of cylindrical shaped objects.

The leading directions of the cylinder are the vertical, the horizontal, the receding (horizontal receding), and the oblique

test of knowing the cylinder is the ability to use it in drawing a great variety of similar forms.

Models Use a variety of models. A roll of pasteboard or paper two inches long,



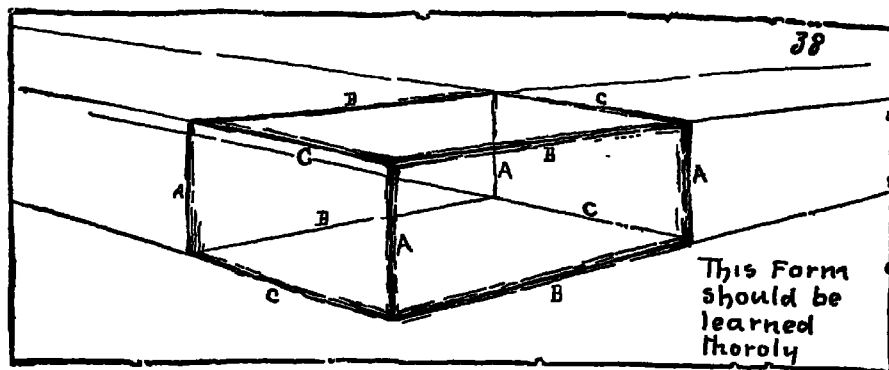
(oblique horizontal receding). These four directions are the ones most commonly used in drawing cylindrical shaped objects; of these the first three are in parallel drawing and the last in oblique drawing.

These four cylinders must be thoroughly learned, learned to the extent that they can be easily, quickly and skilfully drawn. The

a small fruit can, a plain tumbler, and cylindrical blocks, are all good models. These models are not to draw from as in object drawing, but are to aid in understanding and learning the cylinder.

The cylinder and sphere are the last of the type forms. The cylinders, together with the rectangular and triangular prisms, are

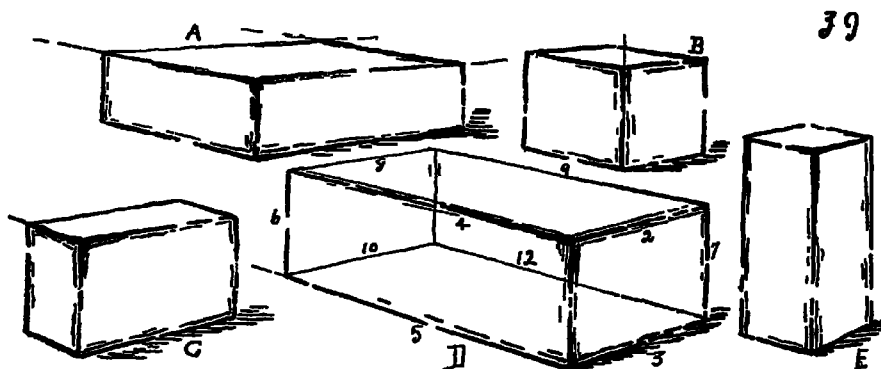




a complete set of measures for all forms. There are no more to learn.

The vertical and horizontal cylinders are drawn alike, except in direction. The unseen

end to make correctly the part that can be seen. Draw the cylinder offhand and in the order of the numbers marked on the lines.



end in each is drawn somewhat wider than the seen end. It is necessary to draw all of

Draw the cylinder about two inches in diameter on paper, and about twelve inches on the blackboard. Mark in the light lines and finish with heavier.

The Receding Cylinder. The receding cylinder corresponds to the horizontal receding lines, hence the sides converge to the center of vision.

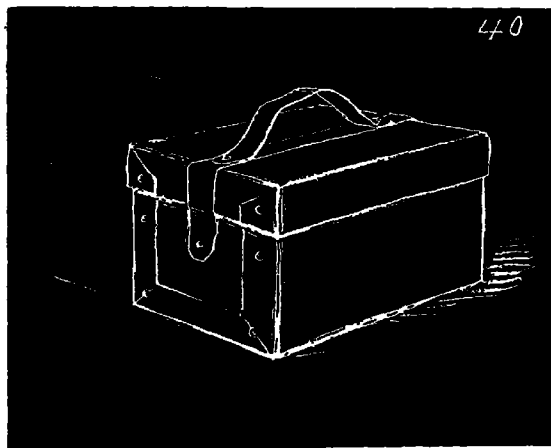
The center of vision is used when drawing this cylinder.

Both the seen and unseen ends are circles; both are alike, except in size.

It is at right angles with the picture plane.

The entire unseen end should be drawn.

The Oblique Cylinder. The oblique cylinder corresponds to the oblique, horizontal receding lines,



hence the sides converge to a vanishing point
The vanishing point is not used when
drawing this cylinder.

These four cylinders must be thoroughly
learned. They must be learned so well that
they can be drawn easily, quickly and with

Forms.



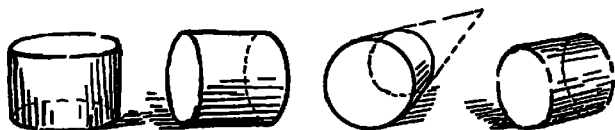
Parallel
prisms



Oblique
prisms.



Cylinders



41

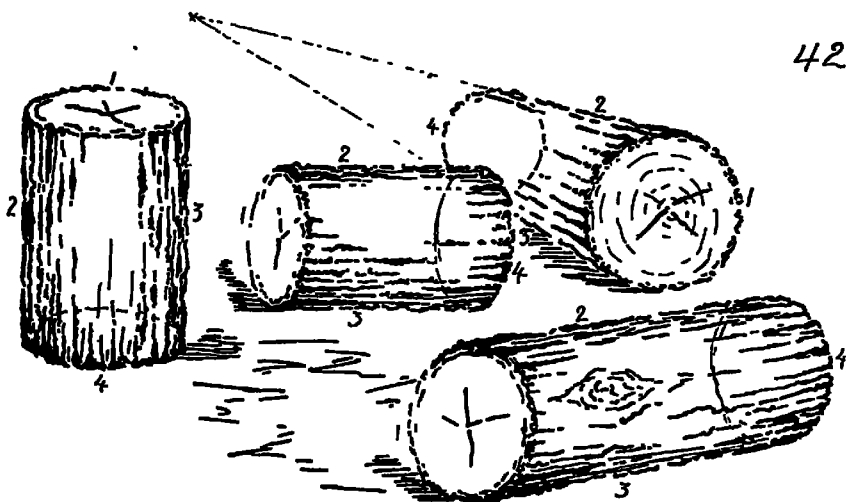
The Vertical cylinder. The Horizontal cylinder. The Receding cylinder. The Oblique cylinder.

Both the seen and unseen ends are ellipses;
both are alike, except in size

It is at an oblique angle with the picture
plane

The entire unseen end should be drawn

a fair degree of accuracy. By learning these
cylinders, the mechanical elements of all
objects similar to a cylinder are being
learned. It is well to draw these cylinders
several times each day until learned



42

DREAMS, *dreams*, trains of ideas which present themselves to the mind during sleep. In dreaming there is no voluntary control over the current of thought, and the principle of suggestion has unlimited sway. A sensation of cold may cause one to dream of snowstorms and freezing; a ray of light may incite a dream of fire, or the action of an undigested meal may bring a train of horrible imaginings. Dreams may in a general way indicate the condition of a person's health and are the frequent accompaniment of some forms of disease.

Usually there is no coherence in the images that appear, but the most extraordinary contradictions excite no surprise in the dreamer. Occasionally, however, intellectual efforts are made during sleep that would be difficult to surpass in a waking state. It is said that Coleridge composed *Kubla Khan*, a beautiful fragment of a poem, while asleep, and other men have done equally incomprehensible things in sleep.

DREDGING, *dred'ing*, the process of removing mud, sand and other obstructions from the bottom of a body of water. Dredging is usually employed for the purpose of deepening harbors and removing obstructions to navigation. The form of dredge in most common use in the United States is that known as the *dipper* dredge. In its construction and working it very closely resembles a steam shovel, except that it is mounted on a barge, instead of on a car (see **STEAM SHOVEL**). The dipper holds from five to fifteen cubic yards and is emptied into a barge, which is held in position alongside the dredge. It may be operated in water to the depth of fifty feet. Several patterns of dipper dredges are used. A popular one is known as the *grapple* dredge; it opens and closes around the earth or stones to be lifted and is of advantage where a direct vertical motion is necessary. Another form of dredge useful in soft bottoms is the *suction* dredge; by its use the mud or ooze is mixed with water and pumped through pipes to the surface.

DRED SCOTT DECISION, a decision of the United States Supreme Court, delivered by Chief Justice Taney, March 6, 1857, in which important questions concerning slavery were decided. The plaintiff, Dred Scott, was a slave in Missouri; his owner took him to Illinois, a free state, then to Minnesota, a free territory by the Missouri compromise,

and finally back to Missouri, a slave state. The plea of Scott was that his residence in Illinois and Minnesota made him a free man. The Supreme Court of Missouri decided against him, and the United States Supreme Court upheld this decision. It decided that Scott was not a citizen; and in additional statements declared that a negro was not considered in American law to be a man, but a chattel, "without rights or privileges except such as those who held the power and the government might choose to grant him." The decision practically admitted slavery to every territory in the Union. It aroused indignation in the North and was one of the important incidents that led within four years to the Civil War. See **UNITED STATES**, subhead *History*.

DREISER, THEODORE (1871-), an American author, was born in Terre Haute, Ind. He attended the public schools at Warsaw, Ind., and Indiana University. He engaged in newspaper work for several years, in Chicago, St. Louis and Pittsburgh, and in 1900 brought out his first novel, *Sister Carrie*, a book of unsparing realism. His second novel, *Jennie Gerhardt*, appeared in 1911, and from then on he devoted himself to literary work. Among his later works are *The Financier* (1912), *The Titan* (1914); *A Hoosier Holiday* (1916); *An American Tragedy* (1925), which brought him special recognition; *A Gallery of Great Women* (1929); *Dawn* (1931); *Tragic America* (1932). Dreiser's effects are achieved by his sincere attempt to present the exact truth and by his deep sympathy for human weaknesses.

DRESDEN, *dres'den*, GERMANY, the capital of the former kingdom of Saxony, is situated on the River Elbe, 111 miles south of Berlin.

The city is distinguished for its excellent educational, literary and artistic institutions, among which are the Polytechnic School, much on the plan and scale of a university, the Conservatory and School of Music and the Academy of Fine Arts. The chief glory of the city, however, is the gallery of pictures, among which is the world's most famous painting, Raphael's *Sistine Madonna*. Dresden is the summer resort of many foreigners and is sometimes called the "German Florence." It suffered severely in the Thirty Years' War and also in 1813, when it was the headquarters of Napoleon's army. Population 625,000.

DRESDEN CHINA, a fragile kind of chinaware, made at the royal factory at Meissen, near Dresden, in Saxony. It was first made in 1709, when Johann Friedrich Bottger, chemist to the elector of Saxony, produced the formula. The manufacture has continued to the present day and includes a variety of shapes. A certain style of delicate ornamentation identified with this china is called *Dresden*.



DRESS, or COSTUME.

Man is the only member of the animal kingdom not provided with a natural garment to protect him from the weather. Furs, hair, scales, feathers and shells are the equipment of beast, bird and fish, and they need take no thought of what they shall wear. Why and when did primitive man, dwelling in the tropics, first array himself in clothes? This question has come to everyone who has studied dress and its relation to the progress of civilization. Some say that an innate sense of refinement was the cause of this action on the part of the savage; others say that the desire for adornment inspired him, and that the sense of modesty developed as a result of his being covered. However that may be, as the human race progressed and different tribes migrated into regions far removed from the equator, garments became a necessity, and dress came to have an established place among the customs of different peoples. As civilization advanced, so did dress, and to-day, generally speaking, the people of the most highly developed nations are the best dressed.

Modern fashions became standardized after the period of the French Revolution. While details vary from year to year, the garments of men and women in Europe and America follow certain general modes based on skirts for the women and trousers for the men. There are, however, certain distinctive forms of national dress that seem to hold their place regardless of the rest of the world. For instance, the Highland Scot still wears his belted plaid, the Russian

peasant his smock, and the Tyrolean mountaineer his short breeches, green blouse, conical hat and picturesque cloak. In North America the Eskimo wears a hood, short trousers and boots of fur and feathers, a costume similar to that of the earliest Eskimos of whom we have any record. The American Indian in many places wears only a loin cloth and blanket, such as the early redmen wore, but, barring these and a few other exceptions, no one style of dress has been common in Europe and North America during the past two centuries. The same general articles of dress have been worn, but the color, shape and trimmings of these garments have varied according to the dictates of fashion, which is governed by the influential classes, and is quite uniform each season throughout Europe and America.

Ancient Dress. Our knowledge of the dress of the earliest peoples is obtained from rude sketches and sculptures and from myths and traditions. Sculptures found in Mesopotamia and Egypt, dating from 300 B. C., show a garment made from a large oblong piece of cloth, carried over the left shoulder and under the right arm, the two edges overlapping on the left side of the body and the left leg. This garment seems to have been commonly used among men and women of high position. Other persons wore only a piece of cloth hanging from a waist belt over the thighs. The Assyrians, who were skilled in dyeing, weaving and embroidering, came to be celebrated for the richness of their attire. It was characteristic of the ancient Greeks that they wore very simple and graceful costumes. In earliest times the dress of the men consisted of a *himation* or *chlamys* only, a garment worn open on one side; later a *chiton*, a close-fitting, sleeveless shirt, reaching below the knees, was worn under the *himation*. The women wore a loose *chiton* of fine linen, reaching to the feet and confined below the bust by a girdle. Sometimes a woolen shawl, called a *peplos*, was draped over the *chiton*. The costume of the ancient Romans was similar to that of the Greeks. They had one characteristic garment, the *toga*, a large, loose cloak, under which was a *chiton*, called a *tunic*. The only other garment was a sandal worn to protect the foot.

The Middle Ages. When the Romans invaded Northern Europe the attire of the barbarian chiefs consisted of striped pan-

taloon and a shirt having sleeves. The women wore simple, loose gowns, usually of wool, with sleeves and girdle. In the Middle Ages the nobles and knights were so constantly engaged in fighting that the most important feature of their attire was necessarily the armor. Both men and women wore cloaks so long that all other details of the costume were concealed. There was never much of a tendency among any ancient people, except the Chinese, to try to fit the clothing to the figure, but near the end of the Middle Ages garments came into fashion which required careful cutting and fitting and much sewing. The dress for women was close-fitting about the bust, waist and hips and gored so as to be very loose and full in the skirts. That for men consisted of a tight-fitting coat, called a *doublet*, laced or buttoned close to the body, and long, snug-fitting stockings.

Related Articles. Consult the following titles for additional information:

Boots and Shoes	Gold Lace
Brocade	Hat
Buttons	Hemp
Calico and Calico	Lace
Printing	Leather
Chiffon	Linon
Cloth (with list)	Mohair
Dyeing	Tunic
Felt	Turban
Flax	Wool and Woolen
Fur and Fur Trade	Manufacture
Glove	

DREW, JOHN (1853-1927), an American actor who won distinction in comedies of society life. In his particular field he was excelled by no one and had few equals. Drew was the son of the Irish comedian John Drew and of the talented Louisa Drew, a well-known stage personage in her day. He was also the uncle of the Barrymores, Lionel, John and Ethel (see BARRYMORE).

At his mother's theater in Philadelphia he made his first professional appearance, and three years later went to New York, where in the years which followed he took various parts under Edwin Booth, Fanny Davenport and other stars. From 1875 to 1892 he was connected with Augustin Daly's company, of which he was for years the leading comedian, winning great popularity as Petruchio in the *Taming of the Shrew* and as Charles Surface in *A School for Scandal*. The plays in which Drew won success as a star include *A Marriage of Convenience*, *The Liars*, *Richard Carvel*, *The Tyranny of Tears*, *The Will*, *Rosemary*, *The Prodigal Husband*, *Major Pendennis* and *The Gay Lord Quex*. His last stage appearance was as one of a

star cast in *Trelawney of the Wells*, 1925, and until his fatal illness in 1927.

DREXEL, ANTHONY JOSEPH (1826-1893), an American banker and philanthropist, born in Philadelphia. He became head of the firm of Drexel & Co., Philadelphia, after having been identified with it since the age of thirteen. He was a liberal patron of science and art, especially music, and founded Drexel Institute of Art, Science and Industry (see below). He was associated with George W. Childs in the inception of the Childs-Drexel Home for Union Printers at Colorado Springs, Colo.

Drexel Institute of Art, Science and Industry, a co-educational institution founded in Philadelphia in 1891 by Anthony J. Drexel. The purpose of the institute is to provide instruction and training in the arts and sciences directly related to industries. The school maintains courses in electrical engineering, fine and applied arts, commerce and finance, mechanical drawing and machine construction, domestic science, mathematics, physics, chemistry and English. Both day and evening classes are provided in all departments, also free public lectures. Admission is obtained through examination or upon presentation of a diploma from an approved high school. The building and equipments exceed \$4,000,000 in value, and there is an endowment fund of \$2,000,000. The library contains about 30,000 volumes. More than 1,200 students attend the day classes and about 2,000 are in the evening classes.

DREYFUS, dra'fus, ALFRED (1859-1935), a French artillery officer, who suffered appallingly because of a conspiracy against him on account of his Jewish ancestry. He was born in Alsace, but moved to Paris in 1874 and took up a course of study to prepare himself for his profession. In his studies and in his service in different regiments he proved himself most able, and in 1891 he was appointed to the general staff. Three years later, without warning, he was arrested on a charge of having sold military secrets to a foreign government. The court which tried him was a secret one; Dreyfus was condemned on the most inadequate evidence and was sentenced to solitary imprisonment on Devil's Island, French Guiana (see FRENCH GUIANA).

Gradually the conviction became general that Dreyfus was innocent and had been the victim of a conspiracy. The effects of the

case were far-reaching. The reputations of high officials were ruined, and great corruption was disclosed in the French army. Throughout the trial, and afterward, the most active defenders of Dreyfus were his brother, Matthieu Dreyfus, and Emile Zola, the novelist (see ZOLA, EMILE). At a second trial, in 1899, Dreyfus was again convicted, but he was pardoned by President Loubet. Returning to his country estates, he began a fight for vindication. This ended in complete success in July, 1906, when the Supreme Court of France acquitted him of the charge of any wrongdoing and rebuked his accusers. He was then made a major in the army and was enrolled in the Legion of Honor.

DRINKWATER, JOHN (1882-), an English author, particularly successful as a playwright, although favorably known also as a poet. He was educated for business, but became a theatrical manager in Birmingham. In such an atmosphere he produced a few dramas, one of which, *Abraham Lincoln* (1918), a biographical play, was very successful, and thus determined his career. With the same biographical motive, the plays *Mary Stuart*, *Robert Burns*, *Oliver Cromwell*, and *Robert E Lee* followed. In conventional prose he published *Mr. Charles, King of England*; *Inheritance*, and *Discovery*. His poetic collections include *Summer Harvest*, *Collected Poems*, and *Poems*.

DROPSY, a diseased condition in which there is swelling in various parts of the body, due to an excess of watery fluid in the tissues. The source of this fluid is the blood. If a person suspects that he is dropsical, he may determine the truth by pressing a finger on the swollen part. When dropsy is present a small pit will remain after the finger is removed. If medicines fail to remedy a dropsical condition, tapping is sometimes necessary, the liquid being drawn off through a drainage tube. Dropsy is a common symptom of heart, liver and kidney trouble.

DROWNING, death by suffocation, the air being excluded from the lungs by a liquid. It is only necessary that the mouth and nostrils be immersed to cause death in this manner. It is probable that complete insensibility comes within one or two minutes after such immersion, but death does not ensue until from two to five minutes after, and cases have been known where persons recovered after having been under water a much

longer time. As in other forms of asphyxiation, efforts to restore life to a patient should not be abandoned for a long time, even though no apparent signs of life exist. Instances are known where people have been revived after hours of apparent death. In all attempts to resuscitate the drowned, prompt action is necessary, but excitement, confusion and haste are not only unnecessary but are really wasteful of time and energy. The rescuer should proceed after some such plan as the following:

Place the body on its face with a roll of clothing under the stomach, the head being supported on the hand. Pull the body over the roll of clothing, to expel the water from the chest, if necessary, press upon the back from the waist toward the shoulders. If the tongue closes the mouth, take it between the fingers, pull it forward and hold it downward. Cleanse the mouth and nostrils from sand or dirt, if they have entered. When the lungs are thoroughly emptied, turn the body on the back and support the shoulders. If the person seems to have stopped breathing, begin at once to stimulate artificial respiration, as described below. In the meantime, if other people are present they should rub the upper part of the body and the limbs vigorously and continuously to encourage circulation, and if the body is very cold, they should lay bottles of hot water about it, but remember that too much heat is dangerous.

Artificial breathing may be induced in the following manner. While the body is lying on its back, with the shoulders slightly raised, kneel over it, place both hands on the lower part of the chest, so that the thumbs hook in under the lowest ribs and the fingers are spread out on the chest, steadily press forward, raising the ribs, your own body being thus thrown forward. This enlarges the cavity of the chest and causes air to enter. When the ribs have been raised to the utmost extent, push yourself back, with a slight effort, to a more erect position, allowing the ribs to return to their natural position. This expels the air. Repeat the process fifteen times a minute. Be careful that the tongue does not fall backward and close the windpipe, if necessary, fasten it forward with a band around the jaw. It is never necessary to be rough with the patient. Gentle, firm and regular movements are the best. As soon as the person is sufficiently restored to be able to swallow, give small quantities of hot brandy and water, hot wine and water or hot coffee, and use every effort to restore and maintain warmth.

DRUGGIST, drug'ist See APOTHECARY.

DRUIDS, the priests of the Celts of Gaul and Britain, who, according to Julius Caesar, possessed the supreme authority there. They had some knowledge of geometry and natural philosophy, superintended the affairs of reli-

gion and morality and acted as judges. They held the oak tree sacred, also mistletoe that grew on it. They had a common superior, chosen from among their number and elected by vote. He held office for life. The Druids surrounded themselves with mysteries, and it is probable that they cherished doctrines which were unknown to the common people; but that they had a great secret philosophy which was handed down by oral tradition is very unlikely. Their public ceremonies were held around rude stone altars and within circular enclosures marked by large stones set at intervals on end. Such circles may be seen at Stonehenge in England. It is thought by scientists that these stones were placed not by Druids but by a people who lived long before their time. The Druids were nearly exterminated by the Romans. See **STONEHENGE**.

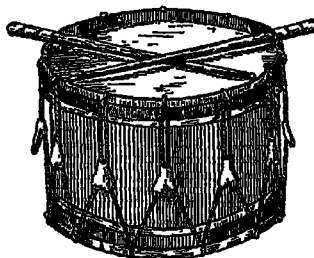
DRUM, the first musical instrument made by man, and the only one yet known among a few tribes in interior Africa. There they take fantastic forms; some are known as *tom toms*, and are beaten with the open hand, but all are made on the same principle as the modern drum.

A drum is either cylindrical or hemispherical in shape, with the end or ends covered with tightened parchment, which is stretched or slackened at pleasure by means of cords with sliding knots or screws. Drums are of three kinds:

1. the *long or bass drum*, played with drumsticks having stuffed knobs on the end, and used only in large orchestras or military bands; 2, the *snare drum*, having two heads, the upper one only being



KETTLEDRUM played upon by two sticks of wood; strings or snares, are stretched across the lower one, giving a peculiar resonant tone; 3, *kettledrum*, a hemisphere



SNARE DRUM

of brass or copper, the end of which is covered with parchment. Kettledrums are

always used in pairs, one being tuned to the keynote, and the other to a higher key, the compass of the two together being an octave.

DRUMMOND, HENRY (1851-1897), a famous preacher, professor and author, born at Stirling, Scotland, educated at Edinburgh University and the University of Tübingen, Germany. In 1877 he became professor of natural science in the Free Church College of Glasgow. During one of his vacations he visited America on a geological expedition to the Rocky Mountains. The lectures given in the course of this tour furnished the foundation for his *Natural Law in the Spiritual World*. He also explored Australia and Africa in search of certain rare species of animal life. In 1893 he traveled through the United States, lecturing before college students and in the larger cities. Up to the time of his death he was engaged in religious work in the colleges of England and Scotland and, with Dwight L. Moody, in the United States. He was a magnetic preacher and a vigorous, stimulating writer. The works upon which his fame rests are *Natural Law in the Spiritual World*, *The Greatest Thing in the World*, *Pax Vobiscum*, *Tropical Africa* and *The Ascent of Man*, a reply to extreme Darwinian views.



HENRY DRUMMOND

DRUMMOND, WILLIAM HENRY (1854-1907), a Canadian physician and author, born at Currawin House, Ireland, and educated at Mohill and at the Montreal high school and Bishop's College, Lennoxville, Quebec. He engaged in the practice of medicine in Montreal and at the same time held the chair of medical jurisprudence in the faculty of Bishop's College. He was widely known as a writer as well as a physician, his contributions of dialect poetry having given him considerable fame. Among these *The Habitant*, *Phil-o-rum's Canoe*, *Johnnie Courteau* and *The Voyageur* are the best known of his works. (For portrait, see article CANADA.)

DRUMMOSSIE MOOR. See **CULLODEN MOOR**.

DEUNKENNESS. See **ALCOHOLISM**.

DEUSES, *droos'es*, a curious people, of mixed origin, said to be of Kurdish, Persian

and Arab stock, inhabiting the mountains of Lebanon, in Syria Their faith is a composite of the Mosaic Law, the Christian Gospels, the Koran and the Sufi allegories They are a self-contained people, resisting efforts to amalgamate with their neighbors They number about 150,000

DEYADS, the wood nymphs of classic mythology According to ancient belief there was in each tree a dryad, whose life was inseparably connected with its growth When the tree perished the dryad died. The name was also applied to nymphs who merely lived in forests

DRY BATTERY. See **ELECTRIC BATTERY.**

DRYDEN, JOHN (1631-1700), an English poet, dramatist and satirist, the greatest writer of the Restoration period in England He was descended from a good family, and was born near Aldwinkle, Northamptonshire. After leaving Cambridge University he went to London as secretary to his cousin, Sir Gilbert Pickering, a favorite of Cromwell. On the death of the Protector he wrote his *Heroic Stanzas* on that event, his first poem of importance, and two years after producing this eulogy of Cromwell, with characteristic tact he wrote a poem in celebration of the restoration of Charles II.



JOHN DRYDEN

His first drama, *The Wild Gallant*, produced in 1663, was unsuccessful. Following it, in rapid succession, nearly thirty plays proved Dryden the foremost dramatist of his time. Unfortunately, he did not use his exceptional ability to elevate the stage, but pandered to the corrupt tastes of the time. Many of his dramas are now classed as immoral. In 1670 Dryden was appointed to the offices of royal historiographer and poet laureate

The first of his political satires, *Absalom and Achitophel*, produced in 1681, had as its object the censure of the Earl of Shaftesbury and his followers for trying to secure for the Duke of Monmouth the succession to the throne This was followed by *The Medal*, a satire against sedition, and *Mac Flecknoe*, a satire on the poet Shadwell. As a member of the Church of England, Dryden wrote,

in defense of that church, his *Religio Laici*; but when, after the succession to the throne of the Catholic James, Dryden became a Catholic, he declared his new beliefs in the *Hind and Panther*. When William and Mary came to the English throne, Dryden was deprived of the offices of poet laureate and historiographer. During the remaining ten years of his life he produced some of his best work, including his admirable translations from the classics and his *Ode in Honor of Saint Cecilia's Day*, better known as *Alexander's Feast*, one of the finest odes in the English language

DRY DOCK. See **DOCK**, subhead *Dry Docks*.

DEY FARMING, a term which does not mean the science of farming on dry soil; it relates to the production of crops on land favored with only a slight rainfall. If less than ten inches of rain falls yearly upon any section of country that area is classed as an arid region, where agricultural effort is fruitless. Formerly it was believed that when rainfall did not exceed twenty inches in a year the prospects for agricultural returns were slight. It is still true that where there is less than fifteen inches of rain all effort is discouraging, but there has developed a principle embodying the conservation of moisture and its storage in the ground which makes good crops possible on millions of acres of land where there is from fifteen to twenty inches of rain. The processes of this conservation and storage constitute dry farming.

Dry farming is essentially a method of preparing the soil so that it will hold moisture as long as possible. The process of cultivation consists chiefly in deep, fall plowing, followed by harrowing. The disk harrow should be used before sowing and later as long as the growing crops permit. The deep plowing and frequent harrowing form a mulch of fine soil upon the surface which prevents evaporation. An important feature of the preparation of the soil is the use of the roller or sub-surface packer. Campbell, in his *Soil Culture Manual*, says that the "packer must follow close to the plow. The plowing done before noon should be packed before going to dinner, and that done in the afternoon packed before leaving the field at night."

The best crop for dry farming seems to be wheat. Corn is also profitable, and potatoes, sugar beets, alfalfa, and even peaches and

other fruits have been successfully cultivated. There are, at the present time, about 800,000 acres in the United States and Canada available for dry farming. Nearly all of this area is in the western states, from Arizona north to Montana, and in southern Alberta and Saskatchewan.

DRY ROT, the decay of timber, due to a fungus which develops in the wood and destroys the fibers. A log so attacked is finally reduced to powder on the inside, though the outside covering of wood remains sound. In spite of the name of the disease, the fungus causing it can develop only in moist situations. The spores often find their way into logs through cracks in the ends; a sure safeguard is to season the timber thoroughly and then cover it with paint.

DRY TORTUGAS, *tor too'gas*, a group of ten small islands belonging to Monroe County, Florida, situated in the Gulf of Mexico, about 120 miles southwest of the southern extremity of Florida Peninsula. The islands are low. One contains a light-house; another, an old Spanish fort, which is the southernmost building on United States territory; another is a large Federal bird reservation.

DU BARRY, *du baré*, MARIE JEANNE BEOU, Countess (1743-1793), a mistress of Louis XV. This monarch became infatuated with her about 1769 and married her to the Comte Du Barry so that she might be brought to court. Until the death of Louis she was the real ruler of the country; the most vital points in the policy of the government were decided by her. She was banished from the court after the death of Louis XV, and in the time of the Revolution was tried for having dissipated the public wealth and executed.

DUBLIN, the capital of the Irish Free State, is situated in Dublin County, 135 miles west of Liverpool, on the east coast of the island, at the mouth of the Liffey, the banks of which for more than three miles from the sea are lined with docks. At right angles to the river is Sackville Street, a splendid avenue forty yards wide, forming a thoroughfare which is continued across the river by O'Connell Bridge, a magnificent structure the same width as the street. The principal public secular buildings are the Castle, dating from the fifteenth century, the official residence of the Lieutenant-Governor; the Bank of Ireland, formerly the

Irish Parliament house; Trinity College; the courts of justice; the customhouse; the King's Inns; the post office; the rotunda; the corn exchange; the mansion house, and the city hall, or corporation buildings. The most important educational institutions are Dublin University, the Royal University, the Royal College of Science, the Roman Catholic University and the Royal Dublin Society. The environs of Dublin are remarkably beautiful. A little northwest of the city, up the Liffey, is Phoenix Park, with an area of 1,759 acres, and Glasnevin, once the favorite residence of Swift, Steele and Sheridan, all of whom were born in Dublin.

In the Sinn Féin and anti-conscription riots and the general unrest incited by German agencies during the World War severe fighting and rioting occurred in the streets of the city; several of the finest public buildings, including the post office, were greatly damaged, and many people were killed or injured. Numerous leaders of the rebellion were executed.

Dublin was taken by the Danes in the ninth century and was in their possession until the English conquest. Population, 1911, 309,272; including suburbs, in 1926, 418,981.

DUBLIN, UNIVERSITY OF, an institution founded in 1591 by Queen Elizabeth, as the College of the Holy and Undivided Trinity. It is usually spoken of as Trinity College, and is the most important institution of learning in Ireland. The corporation now consists of a provost, seven senior fellows, twenty-six junior fellows and seventy foundation scholars. The senate possesses the right of electing the chancellor of the university; it is also the body which grants degrees. The scholarships are tenable for five years, or till the degree of M. A. is attained. Admission is by examination, and the course of general instruction extends over four years. The number of students is usually about 1,300.

DUBUQUE, *doo buke'*, Iowa, the county seat of Dubuque County, about 170 miles west of Chicago, on the Mississippi River and on the Chicago Great Western, the Chicago, Burlington & Quincy, the Illinois Central and the Chicago, Milwaukee, Saint Paul & Pacific railroads. The railroad bridge is owned by the Illinois Central; two bridges are owned by local companies. The river commerce is considerable.

The city is an important agricultural market, and has lead and zinc mining interests. There are also railroad repair shops, pork-packing houses and lumber mills, manufacturing of boots and shoes, wagons, hardware, furniture and overalls, as well as scores of lesser enterprises. There has been considerable ship building, also. Two sash and door factories and pump factories are said to be the largest of their kind in the world; the sheet metal works rank also among the largest. The city has a public library and a United States government building and is the seat of Saint Joseph's College, Mount Saint Joseph's Academy, Wartburg Seminary, Dubuque College and the Iowa Institute of Science and Arts. It is the oldest city in the state and was named in honor of Julian Dubuque, a French Canadian, who located here in 1778. The first permanent settlement was made in 1833. Population, 1920, 39,141, in 1930, 41,679, a gain of 6.5 per cent.

DUBUQUE, JULIAN (1762-1810), a native of Quebec who ventured westward and in time reached the Mississippi River (1785). He journeyed down its west bank and where the city of Dubuque (later named for him) now stands he made a treaty with the Indians by which he secured a friendly concession to work lead mines which he had discovered. This source of wealth and a brisk trade in furs engaged him for the rest of his life. He maintained friendly relations with the Indians, they buried him with the distinguished honors accorded chiefs of their tribes.

DUO'AT, a coin formerly common in several European states, especially in Italy, Austria and Russia. Some ducats were made of silver, some of gold. The average value of the former was from 75 cents to \$1.10, that of the latter, about \$2.32. The most famous ducats, those of ancient Venice, had a value equivalent to \$1.46. The ducat is featured in *The Merchant of Venice*.

DUCHY, *duch's*, a dominion or territory ruled by a duke or duchess. If the ruler is a grand duke or grand duchess, the country is styled a *grand duchy*. The present most conspicuous example in the world is the grand duchy of Luxemburg (which see), the ruler of which is the Grand Duchess Charlotte (born 1896). She assumed office on January 15, 1919, after the abdication of her sister, Marie Adelaide. See WORLD WAR: also. DUKE AND DUCHESS.



DUCK, a web-footed bird, related to the goose and the swan. It is everywhere considered a table delicacy, especially a number of the wild varieties, and therefore within reasonable limits it is the legitimate prey of sportsmen. Game laws protect it except during a short season in the autumn. The species can be classed as *deep sea* ducks, which often obtain their food by diving to a great depth, and *river* ducks, which remain in shallow water. Some

species are migratory, going northward in summer to their breeding places. The duck's food is partly vegetable, partly animal.

Description. Ducks have short, thick bodies, covered with thick feathers, under which is a fine, soft down. In some varieties the feathers are beautifully colored. The bill is broad and flat, with toothed edges, for holding or straining food. The head is rather large; the neck, long and gracefully curved, yet much shorter than the neck of the goose or swan. The feathers are well oiled from glands situated ahead of the tail, and are therefore waterproof. A peculiar characteristic of the short legs is that they are located back of the center of the body; this causes a strange movement in walking, sometimes called a "waddle."

The food of the wild ducks consists largely of insects, minnows, small frogs, grain, grasses, etc.

Varieties. The common *mallard*, or wild duck, is the original of the domestic duck. In its wild state the male is characterized by the deep green plumage of the head and neck, by a white collar separating the green from the dark chestnut of the lower part of the neck and by having the four middle feathers of the tail recurved. Some tame ducks have nearly the same plumage as the wild ones; others vary greatly, being generally duller or pure white, but all the males have the four recurved tail feathers. There are several favorite varieties of the domestic duck, those of Normandy and Picardy in France and the Aylesbury ducks in England, being remarkable for their great size

and delicacy of flesh. The *musk duck*, erroneously called the *Muscovy duck*, a native of South America, is the largest of the duck kind and approaches nearly the size



BILL OF MALLARD DUCK
As seen from above and from the side

of a goose. The *canvasback duck* is peculiar to America and is celebrated for the excellence of its flesh.

Other species of ducks are the *shoveler*, remarkable for the strange form of its bill; the *gadwall*, which is more rare in America than in Europe; the *ptarmigan*, remarkable for its long tail; the *black*, or *dusky*, *duck*, peculiar to America, and very abundant; the *summer*, or *wood*, *duck* remarkable for its great beauty and for its migrations, which are directly opposed to those of other species; the *teal*, prized for its flesh, and the *eider duck*, so well known for its down. See EIDER DUCK; GADWALL; SHOVELER; also the colored plate in article GAME.

DUCK-BILLED PLATYPUS, or **DUCK'-BILL**, also called *ornithorhynchus*, the lowest of the mammals, a peculiar creature, liv-



DUCK-BILLED PLATYPUS

ing in the quiet streams of Australia, Tasmania and New Guinea. It is about twenty inches long, rather slender and covered with brown hair. Its head is small and instead of a nose it has a horny bill, resembling a duck's with nostrils, however, at the extreme end, enabling the animal to breathe with only the tip of his bill out of the water. The male



DUCKBILL ASLEEP

has on each heel a sharp, horny spur, which he uses for defense. Duckbills usually live in large colonies in the banks of streams, each pair inhabiting its separate burrow. The food consists chiefly of insects and worms, which the animal comes out to get at night. On land, duckbills walk about very clumsily on their short legs and webbed feet, but in water they move very rapidly.

DUCKING STOOL, a device used in former times in Great Britain and in the American colonies to punish a scold. It consisted of a chair fastened at the end of a strong beam, which, by means of a pivot, could be dipped into a pool or river. The culprit was placed in this chair, fastened securely and then dipped into the water. In some parts of England the ducking stool was in use up to the early years of the nineteenth century, and was only recently abolished by law in Delaware.

DUCTILITY, the property of solid bodies, particularly metals, which renders them susceptible of being drawn into wire. Gold is of all metals the most ductile. Following, in the order of their degree of ductility, are silver, platinum, iron, copper, zinc, tin, lead and nickel. Gold can be drawn into wire so fine that 500 feet of it will weigh less than a grain, and platinum, when combined with silver, can be drawn into wire 1-30,000 of an inch in diameter. Glass can be drawn into a thread so fine that a mile of it will weigh only one-third of a grain.

DUDEVANT, *du d'vahn'*, MADAME. See SAND, GEORGE.

DUEL (from the Latin *duellum*, from *duo*, two), a prearranged combat between two persons, with deadly weapons, for the purpose of deciding a serious private difference or quarrel. The combat generally takes place in the presence of witnesses, called *seconds*, who make arrangements as to the mode of fighting, place the weapons in the hands of the combatants and see that the rules they have prescribed are carefully followed. Duelling probably originated with the combats of "champions" which in times past settled various disputes, notably those arising over titles to property. It was to some extent the outcome of the spirit and institutions of chivalry. Though generally prohibited by law, duels are common in the army and among university students in Germany, and to a less extent in France; they are very rare in the United States. In some of the states

the killing of a man in a duel is punishable by death or by forfeiture of political rights, and in a large number the sending of a challenge is a felony.

DUERO, *dua'ro* See DOURO.

DUFFERIN AND AVA, FREDERICK TEMPLE HAMILTON BLACKWOOD, Marquis of (1826-1902), a British diplomatist and statesman, Governor-General of Canada from 1872 to 1878. He was educated at Eton and Oxford. After spending several years in managing his Irish estates he soon became a prominent member of the Liberal party, was sent on a number of important foreign missions and also held several Cabinet positions under Lord Palmerston, Earl Russell and Gladstone. In 1872 he was appointed Governor-General of Canada. Here he was given opportunity to display his brilliant abilities in dealing with the many problems of the newly-formed Dominion. His great personal charm, added to his known ability, combined to make his administration one of the most popular in the history of Canada. He returned to England in 1868 and for nearly thirty years continued in public service, successively as Ambassador to Russia, British commissioner in Egypt, viceroy of India, Ambassador to Italy and Ambassador to France. (Accompanying the article CANADA is a halftone group containing a picture of Dufferin.)

DUGONG, a native mammal of the Indian seas, resembling the whale in some respects. It has a tapering body, ending in a crescent-shaped, finlike tail, and is said sometimes to attain a length of twenty feet, though gen-



DUGONG

erally it is about seven or eight feet long. The thick, smooth skin is bluish on the upper and white on the lower parts of the body, and bears a few scattered bristles. The dugong's food consists of marine plants, which it finds in the mouths of large rivers. It is hunted by the Malays for its flesh, which resembles young beef.

DUKE AND DUCHESS, *dutch'es* In Great Britain and several other European countries the title *duke* is the highest hereditary rank after that of prince. The title *duchess* is borne by the wife of a duke, or by a lady who possesses sovereign rights in a duchy. The title *duke* was first adopted in England under Edward III, who in 1337 conferred the title Duke of Cornwall upon his son, the Black Prince. In Great Britain a duke is addressed as "Your Grace," or in writing, "The Most Noble, the Duke of—." The eldest son of a duke has the rank of marquis and is called *lord*, while younger sons and all of the daughters are by courtesy addressed as *lord* and *lady*. French dukes under the republic have no special privileges, the title indicating merely noble descent. In the former German Empire some of the Princes of the smaller states were of the rank of duke.

DUKE UNIVERSITY, a school for higher education at Durham, N. C., formerly Trinity College. In 1924 James B. Duke, tobacco manufacturer, gave \$40,000,000 to various interests in North Carolina, and stipulated that one-fifth of the income should be set apart unspent until it should amount to another \$40,000,000. Thirty-two per cent of the benefaction was given to Trinity College, with the expressed wish that the name of the school should be changed to Duke University. The university is co-educational, there are about 360 instructors and 3,300 students.

DUKHOBORS, *doo ku bawrs'*, a religious sect which originated in Russia in 1733. Their name means *spirit wrestlers*, and refers to their denial of the divinity of the Holy Ghost. Persecutions by the Russian government caused numbers of them to emigrate to Canada in 1902, where there are now about 9,000 of the sect. They do not believe in organized government. They have no church ceremonies, and marriage is contracted without formalities, though it is held sacred. They are an industrious, generally harmless people, but in recent years an extremist group, the Sons of Liberty, have caused much trouble. Some of the practices of the Dukhobors do not accord with the Canadian idea of decorum, so numbers of the sect have emigrated. Some established a colony in Uruguay, where they were welcomed; some went to Mexico, where they were received less fervently.

DULUTH, *du looth'*, MINN., third in size among the cities of the state and county seat of Saint Louis County, about 162 miles northwest of Saint Paul and Minneapolis, at the west end of Lake Superior. It has the service of eight railroads: the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago Northwestern, the Duluth, Missabe & Northern, the Duluth, South Shore & Atlantic, the Duluth, Winnipeg & Pacific, the Great Northern, the Minneapolis, Saint Paul & Sault Ste. Marie and the Northern Pacific railways. Interurban and bus services connect with neighboring cities. The airport is six miles distant.

The Duluth-Superior harbor has an area of 19 square miles with 49 lineal miles frontage; 46 wharves handle ore, coal and grain. The storage capacity for coal is about 13,000,000 tons and for grain 53,000,000 bushels. The facilities for handling freight are unsurpassed.

The city is situated at the head of the Great Lakes. To the north and west are the great iron ore mines of the Mesaba, Vermilion and Cuyuna ranges; it is adjacent to the immense wheat fields of the Northwest. Hence the huge volume of freight that passes through the harbor.

The principal manufactures are iron, steel and other metal products, textiles, paper and chemicals, wood products, woolen goods, grain products, cement and dairy products.

The chief buildings and institutions are a state teachers' college, a public library, a junior college, four hospitals, the city hall, the armory, the Amphitheatre, the courthouse and the post office.

For recreation the public has access to 13 playgrounds covering 27 acres, five athletic fields with 105 acres and 76 parks with 2,500 acres. There are also six golf courses for public and private use. The Boulevard Drive extends along the brow of the hill for a distance of more than 25 miles, overlooking the city and Lake Superior.

Daniel de Greysolon, Sieur de Lhut, after whom the city was named, visited this district in 1679, raising the French flag on Minnesota Point at a great Indian council then in session. The Northwest Company established a trading post on the outer bay in 1792; the American Fur Company, controlled by John Jacob Astor, began similar operations in 1817.

Duluth was under the French flag until

1763. The British maintained possession for the next twenty-one years. Since 1784 the city and district have been a part of the United States. This region was occupied in early times by Ojibway and Chippewa Indians chiefly, but the Sioux were present in large numbers.

Duluth was incorporated as a village in 1857 and as a city in 1870. It is governed by a commission. Population, 1930, 101,463.

DUMA, or **DOUMA**, *doo'mah*, the lower branch of the Russian Parliament, established by an edict of Czar Nicholas II in 1905. This body was reorganized in 1907, and continued to be the only popular national assembly of the Russians until the revolution of March, 1917. At the beginning of the revolution it was supplanted as an instrument of government by a provisional committee made up of certain of its members, and in June it was abolished by a vote of the All-Russian Congress of Workmen's and Soldiers' Delegates.

The Duma never possessed extensive powers. It could not discuss the reports of the Minister of Finance or charges of malfeasance against officers of the government or members of the Council; it could not consider questions relating to titles of nobility or entailed estates. The Ministers had more legislative power than the regular legislative body, for while any member of the Duma could propose a law, this could not be presented to the house until it had received the approval of the Minister of the Department concerned.

DUMAS, *du mah'*, **ALEXANDER** (1802-1870), a French novelist and dramatist. He was the grandson of the Marquis de la Paillieres and a negress named Dumas, from whom he inherited many characteristics, both physical and mental. In 1823 he took up his residence in Paris and obtained, through the Duke of Orleans, afterward Louis Philippe, an assistant secretaryship. He scored his first success in 1829 with the drama *Henry III*. The same year appeared his *Christine*, and other dramas followed in rapid succession. He then turned his attention to romance, with



ALEXANDER
DUMAS

the definite purpose of writing a series of novels which should deal with the whole course of French history, and the result was his remarkable list of historical romances, of which the best-known are *Three Musketeers*, *Twenty Years After* and the *Comte de Bragelonne*. The *Count of Monte Cristo*, *The Black Tulip* and several others are also well known to English readers, through translations.

The works which bear Dumas' name amount to almost three hundred volumes, but the only claim which he could lay to many of the productions issued under his name was that he had either sketched the plots or revised them before they went to press. He earned large sums of money, but lost it all through recklessness and extravagance. After wandering about Europe for many years, he went to live in the home of his son, whom he had neglected in his childhood and had led into much recklessness and dissipation in his young manhood, and died there.

DUMAS, ALEXANDER (1824-1895), a French dramatist, son of the novelist of the same name. His literary career began with the publication, in 1848, of a novel, *La dame aux camélias* (*Camille*), which was presented four years later in the dramatized form. This, his best work, has retained its popularity to the present day. All of his dramas deal satirically with the follies and vices of French society and present forceful arguments for social purity.

DU MAURIER, *du mo rya'*, GEORGE LOUIS PALMELLA BUSSON (1834-1896), a British artist, caricaturist and novelist, born in Paris. He went to England in 1851 and made that country his home, becoming a naturalized Briton. He studied chemistry, but afterwards adopted art as a profession. After studying in Belgium and France he began to draw for *Once a Week*, *The Cornhill Magazine* and *Punch*. He contributed to Harper's Magazine many illustrations, besides three novels, among them *Trilby*, on which his fame chiefly rests, *Peter Ibbetson* and *The Martian*.

DUMB-BELLS, weights usually in the form of two iron balls connected by a straight piece or handle. They are used in gymnastic exercises for strengthening the muscles of the arms and chest. The dumb-bells in ordinary use weigh from one to ten pounds each, though much heavier ones are used in trials

of strength. Ordinarily a person should not use those weighing over five pounds; the weight preferred for women is somewhat less.

DU'NABURG, LATVIA, (in Latvian, DAUGAVPILS) a prosperous manufacturing city 112 miles southeast of Riga. When under Russian administration, prior to 1916, it had extensive munition factories, which were destroyed by the German army in that year. Population in 1930, 43,000.

DUNBAR, PAUL LAURENCE (1872-1906), a negro poet, born in Dayton, Ohio, where he graduated at the High School and for some time served as an elevator boy. He worked at journalism in New York, and after 1898, the year of his marriage, he was on the staff of the Congressional Library. He gave frequent readings from his own works, which include *Poems of Cabin and Field*; *The Fanatics*, a novel; *Candle-Lightin' Time*, a volume of poems; and *Lyrics of Love and Laughter*. Dunbar usually wrote in dialect, and portrayed, with perhaps the first high poetic genius shown by his race, the actual humor and pathos of Southern negro life.

DUNCAN, NORMAN (1871-1916), a Canadian author and educator, born at Brantford, Ontario; educated at the University of Toronto. From 1897 to 1900 he was on the staff of the *New York Evening Post*; from 1901 to 1904 he was professor of rhetoric at Washington and Jefferson College; and he was also professor of English literature at the University of Kansas for a time. He is best known, however, as an author. His best books include *Doctor Luke of the Labrador*, *The Way of the Sea*, *The Cruise of the Shining Light*, *Dr Grenfell's Parish*, *Every Man for Himself*, *Billy Topsail & Company*, *The Best of a Bad Job*, *The Suitable Child*, *Finding His Soul*, *The Bird-Store Man* and *Australian Byways*.

DUNCAN, SARA JEANETTE (1862-1922), a Canadian author whose works were appreciated on both sides of the international boundary. She spent much of her life in India with her husband, Everard Coates, and Indian life is reflected in such books as *The Simple Adventures of a Mem Sahib* and *The Story of Sonny Sahib*. She also wrote *Those Delightful Americans*, *His Royal Happiness*, and *The Imperialist*. Early in life she wrote for the *Toronto Globe*, and contributed occasionally to other papers.

DUNDEE, SCOTLAND, a city in the County of Forfar, on the Firth of Tay, about eight miles from the open sea and thirty-seven miles northeast of Edinburgh. It is noted for its granite quarries and for its textile manufactures, particularly those of coarse linens. Dundee is now the chief seat of the linen trade of Scotland and of the jute trade of Great Britain. Shipbuilding is extensively carried on, and there are large engineering establishments. Another branch of business is the northern seal and whale fishery. The place is also one of the aeroplane stations of Great Britain. Dundee was made a royal burgh in the twelfth century by William the Lion, and it held an important place in the medieval history of Scotland. Population, 1934, 177,500.

DUNE, a hill formed by drifting sand. Strong winds drive sand and soil through the air very much as they drive snow. When the sand meets an obstacle like a boulder or log, some of it is lodged. Thus a small mound is formed, which continues to stop more sand. In this way low hills are formed along sandy coasts, and sometimes on the plains, where the surface soil is loose and easily disturbed. The height of these hills varies from forty to 200 feet. Dunes are quite common along the Atlantic coast, among the cliffs in England and around the southern end of Lake Michigan, a region which, on account of these peculiar formations, is of especial interest to geographers. This latter region was constituted a state park in 1923 by the Indiana legislature. See GEOLOGY.

DUNEDIN, *dun's-dun*, NEW ZEALAND, capital of the provincial district of Otago, and the most important commercial town in the islands. It is situated on South Island, at the head of Otago Harbor, fifteen miles from sea. Though founded in 1848, it has made rapid progress only since 1861, when extensive gold fields were discovered. At present, gold dredging is a profitable industry. There are many handsome buildings, both public and private, among them being municipal buildings, a post office, government offices, a university, a new museum and an athenaeum. Several woolen and other manufactories provide employment, and raw wool is exported in large quantities. There is a regular line of steamers between this port and Melbourne, and good communication with all parts of New Zealand. Population, 1934, 88,500.

DUNKERS, DUNKARDS, or TUNKERS, a religious sect founded in Germany in 1708. It takes its name from the German *tunken*, to dip, from the mode of baptizing converts. Between 1719 and 1729, because of persecution, nearly all members of this sect emigrated to the United States and settled in Pennsylvania. They are now found in Ohio, Indiana, Illinois, Iowa and some of the southwestern states. The total number of members is approximately 163,000; of churches, 1,300. The Dunkers wear a plain and uniform dress, have nothing to do with politics, take no oaths, avoid lawsuits and war, denounce divorce, abstain from the use of alcoholic drinks and discourage the use of tobacco. Since 1906 their official name has been Church of the Brethren.

DUNKIRK, FRANCE, a fortified seaport town in the department of Nord, situated at the entrance of the Strait of Dover. Dunkirk lies twenty-eight miles northeast of Calais, not far from the Belgian frontier. It was subjected to numerous bombardments from the sea and air by German forces during the World War. The war reduced the population from about 40,000 to 5,000, but most of this loss was restored, for the census of 1931 reported about 35,000 people in the city. Dunkirk is the third port in France in tonnage of imports and exports. The former include such raw textile material as wool, cotton, jute, and flax; the latter, woolen and cotton goods, iron and steel, chemical products, machinery, and cement. Many of the people earn their living by fishing; fleets are sent to the Iceland fishing fields, and from the North Sea are obtained vast quantities of herring. The largest ocean vessels find ample docking facilities along five miles of quays in a harbor of 115 acres.

DUNKIRK, N. Y., a city in Chautauque County, forty-eight miles southwest of Buffalo, on Lake Erie, and on the New York Central, Nickel Plate, Erie, and Pennsylvania railroads, and Buffalo-Erie bus line. There is an airport. The city has a good harbor and considerable lake commerce. The industries include the American Locomotive Works, steel mills, and manufactures of radiators, motors, valves, gloves, underwear, and lumber products. Grapes are shipped in very large quantities. The city has several parks. Population, 1930, 17,802.

DUNNE, FINLEY PETER (1867-1936), an American journalist and humorist, born in Chicago. After obtaining a common school education, he went into newspaper work. He has become famous through his creation of one *Mr. Dooley*, a publican of Archey Road, who converses on political and social topics with his friend *Mr. Hennessey*. *Mr. Dooley in Peace and War* was his first volume.

DUNS SCO'TUS, JOHN (1265-1308), one of the best thinkers of the Middle Ages, a member of the Order of Franciscans. He studied at Oxford and in 1301 became professor of philosophy there. He was an apostle of free will and an ardent defender of the doctrine of the Immaculate Conception, a doctrine which has since been declared (1854) a necessary part of the Roman Catholic faith.

DU PONT, a family of American manufacturers of French descent who were the first to make a good grade of gunpowder in the United States and whose products now embrace a large number of commodities developed through intensive chemical research. Though not the founder of the business, the first important name was that of Pierre Samuel du Pont de Nemours, who is memorialized in the title of the present company, which is the E. I. Du Pont de Nemours & Company.

Pierre Samuel (1739-1817) was a French economist of note who was often consulted by his government. He assisted in drafting the document acknowledging American independence in 1783. During the Reign of Terror he was thrice imprisoned, then went to America for a time. After returning home he was one of the French committee that drafted the treaty that transferred Louisiana to the United States. From 1815 he lived in Delaware, whither his two sons had preceded him.

Eleuthère Irénéé du Pont, the older son, learned the powder-making business in France. He and his brother, Victor Marie, emigrated to America to speculate in land, but learning there was no good powder in the United States, they established a factory for its manufacture in Wilmington, and it prospered. Their powder was used by the government in the War of 1812, and South American trade grew, as did their business with the great fur companies. The present day Du Ponts are Pierre Samuel (born 1870), Irénéé (1876), and Lamot (1880).

DURBAN, SOUTH AFRICA, the only seaport of Natal, and one of the most important ports in South Africa. Among the public buildings are the town hall, a library and a theater. The harbor is very well protected and affords excellent accommodation. The port is situated at the terminus of two railway lines leading into Orange River and Transvaal colonies. Durban was founded in 1823 by the Dutch. Population, 1931, 86,296 (white), 65,000 (colored).

DURBAR, a term used in India, to designate an important public meeting or conference. It comes from the Persian word for *audience*. At these meetings matters pertaining to state affairs in India are considered, or they may be held in honor of distinguished visitors or to celebrate some great event. A durbar of recent occurrence and of unparalleled magnificence was held in 1911, when King George and Queen Mary visited India, and the former was crowned Emperor of India at Delhi. At this time Delhi was made the capital of British India, in place of Calcutta.

DURER, ALBRECHT (1471-1528), a German painter, designer, sculptor and engraver on wood and metal. He was the inventor of a method of printing woodcuts in two colors. In 1505 he visited Venice and henceforth his work showed the influence of the Venetian painters. Maximilian I appointed him court painter, and Charles V confirmed him in this office. He was very popular at court and also with the common people. Luther, Melancthon, Erasmus, Bellini and Raphael were among his friends. His masterpieces in painting include *Crucifixion*, *Adam and Eve*, an *Adoration of the Magi* and portraits of Raphael, Erasmus and Melancthon. Among his best engravings on copper are his *Fortune*, *Melancholy*, *Adam and Eve in Paradise*, *Saint Hubert*, *Saint Jerome* and the so-called *Smaller Passion*.

DURESS, du res', in law, is compulsion or restraint under which a person is forced to do a thing or to refrain from doing it. The force employed may be physical violence or detention without an avenue of escape. A person is not legally responsible for acts committed in such circumstances, but duress must be proved to establish guiltlessness.

DURHAM, LORD JOHN GEORGE LAMBTON, First Earl of, (1792-1840), an English statesman, born in London and educated at Eton. He held a commission in the army on completion of his education, but soon gave

his attention to politics. In 1813 he entered Parliament for Durham as an advanced Liberal. In 1828 he was created Baron Durham. In 1833 he was appointed ambassador extraordinary to Russia, and in 1838 Governor-General of Canada. While Lord Durham remained in Canada as Governor-General only six months, the conditions at the time of his appointment and his able statesmanship made a lasting impression upon the history of British North America. When appointed Governor-General, a rebellion against the home government had broken out and Canadian affairs were in a turbulent condition. Lord Durham made inquiries in the various provinces as to the exact condition of the people with regard to the form of government, and held a conference with the governors of the provinces. This conference resulted in a plan for the confederation of the provinces. He pointed out the necessity of making the executive of the government responsible to the people. As a result of his suggestions Upper and Lower Canada were united in February, 1841.



EARL OF DURHAM

DURHAM, *dur'am*, N. C., the county seat of Durham County, twenty-six miles northwest of Raleigh, on the Norfolk & Western, the Southern, the Seaboard Air Line, the Durham & Southern, and the Norfolk Southern railroads. The city produces 24 per cent of American-made cigarettes, and contains one of the largest smoking-tobacco factories in the world. There are also cotton and hosiery mills. It is the seat of Duke University, formerly Trinity College, and has also a school of fine arts, a conservatory of music, a secretarial school, a college for negroes, a public library and a hospital. Population, 1930, 52,037.

DUSE, *doo'sa*, **ELLEANORA** (1859-1924), possibly the greatest Italian actress of the latter part of the last century. Her first appearance, at thirteen years of age, made no distinct impression, and it was not until several years later that her remarkable talents were recognized. Gradually, however, she came to be acknowledged as one of the greatest actresses. In her tours in Germany,

America, England and France, she was received with the greatest enthusiasm, especially in the rôles Juliet, Marguerite and Francesca da Rimini. Several of D'Annunzio's plays were written for her, and in these she met with her greatest success.

DUSSELDORF, **GERMANY**, a city of the Rhenish province in Prussia, on the right bank of the Rhine, twenty-two miles north of Cologne. It is one of the handsomest cities in the valley of the Rhine, and has existed since about 1280. It is a great focus of railway and steamboat communication and has a number of handsome public buildings and several remarkable churches. The town hall dates from 1587. Among the public institutions, the Academy of Art is of special interest. Dusseldorf has the honor of having founded a school of painting, which takes the name of *Dusseldorf* and has had a large number of distinguished pupils. The Hofgarten is one of the finest public gardens in Germany. The industries include the manufacture of iron goods, cotton, leather, tobacco, carpets and chemicals, and the trade is large, ships carry Dusseldorf's factory products to Great Britain, the Scandinavian countries, and to Mediterranean cities, countries and colonies. The city began to develop commercially after 1850. Population, 1933, 498,600.

DUST, **ATMOSPHERIC**, consists of floating matter held in suspension in the air and particles carried into the air by the wind. Even when the air is fairly clear there are at least 8,000 dust motes to the cubic inch, and this is about one-fourth the number present when the air is hazy. Flying dust particles which the winds carry about are never higher than a few hundred feet in the air, but the tiny dust motes of the upper atmosphere are found miles above the earth. A large part of these motes have their origin in volcanic eruptions; another important source of supply is the outpouring of countless chimneys. Other dust motes are bits of sand, and planetary dust gathered from space by the earth.

The dust of the lower atmosphere plays an important part in changing the surface of the earth. Much of the sediment which causes the overflows of the Hoang River, in China, is wind-blown dust. Flying dust and wind-blown sand level off surfaces of plains, fill up valleys, modify coast lines and otherwise affect the contour of the

earth. Dust particles in the air also have an important relation to rainfall, as each particle serves as a nucleus about which a drop of mist gathers. Masses of mist form clouds, and when condensation takes place there is a fall of rain. Dust is also an agent in the spread of disease, since flying particles may carry about germs that cause sickness. Washing, oiling or tarring streets and roads when there is much dust in the air is a safeguard.

DUTCH EAST INDIES, a name given to the Dutch possessions in the Malay Archipelago, comprising Sumatra, Java, Madura, Riau Lingga, Billiton, Celebes, Moluccas, Bali and many minor islands, with parts of Borneo, Papua and Timor. The capital is Batavia. The total area is estimated to be 733,300 square miles, and the population, 1933, 60,730,000.

DUTCH GUIANA, *ge ah'nah*, now officially called **SURINAM**, is a colony on the Atlantic coast of South America, belonging to the Netherlands. Brazil is south, British Guiana is west, and French Guiana is east. The area is 54,291 square miles—about equal to that of Mississippi; in 1931 it had a population of 153,306, not including negroes and forest Indians. About one-third of the people live in Paramaribo, the capital city, whose population was 47,318 in 1931. The language is Dutch; there is entire religious freedom. Government is in the hands of four councillors, appointed by the sovereign of the Netherlands. The country lies slightly north of the equator, and the agricultural products are such as are found in all warm climates. The principal sources of income are from sugar, bananas, cacao, rice, rum and molasses. Corn grows in the higher altitudes.

The Netherlands acquired this territory from England in 1667 in exchange for New Netherlands (now New York) in North America. Since then it has reverted twice to England, but in 1814 Netherland's claim was confirmed by the London Convention, at the close of the Napoleonic wars which sent the "Little Corporal" to Elba.

DUTCH METAL, an alloy containing $84\frac{1}{2}$ parts copper and $15\frac{1}{2}$ parts zinc. It has a fine golden-yellow color, is ductile, malleable and tenacious. When beaten out by a process analogous to that for gold leaf, until the sheets are less than 1-50,000th part of an inch thick, it constitutes Dutch leaf, or Dutch

foil, and is used instead of gold leaf for ornamental purposes.

DUTIES. See **Tax**; **CUSTOMS DUTIES**; **INTERNAL REVENUE**.

DVINA, *dve nah'*, a river which rises in Northern Russia and flows in a general north-westerly direction, into the White Sea at the Gulf of Archangel. At Archangel, before it separates into four estuaries, it is four miles broad. It is navigable as far as Suchona, and is connected with the Volga by canal. The length of the river is 760 miles.

DVINSK, *dvoensk*, the Russian name for Dunaburg (which see).

DVORAK, *dvor'shahk*, **ANTONIN** (1841-1904), a Bohemian composer, born in Mullhausen. He studied at the Prague Conservatory and at Vienna. Much of his life was spent in England and in the United States. From 1892 to 1895 he was director of the National Conservatory in New York. While in America he became interested in negro and Indian melodies, and some fine expressions of these are to be found in his works. His compositions include symphonies, operas and sacred compositions, among the last the best known being *Stabat Mater* and *Requiem Mass*. With Smetana he stands at the head of Bohemian composers.

DWARF, a term applied to any animal or plant greatly below the usual size of its kind, particularly to an unusually small human being. Accounts of dwarf tribes in Africa have been common from early times, and it would appear from the accounts of Du Chaille, Schweinfurth and other travelers that there are several dwarfish tribes throughout that continent. Chief among these are the Akka dwarfs of Central Africa; and a race is said to exist in the Congo, not as a distinct community, but mixed with other tribes.

Individual dwarfs occur in all races and were formerly a fashionable appendage to the courts of princes and the families of nobles. Jeffery Hudson, the favorite dwarf of Charles I, at the age of thirty is said to have been only eighteen inches high, though he afterward grew to three feet nine inches. Bébé, the celebrated dwarf of Stanislas of Poland, was thirty-three inches; Wybrand Lolkes, a Dutch dwarf, when sixty years of age was only twenty-seven inches; Francis Flynn—"General Mite"—was only twenty-one inches at sixteen. The best-known dwarf of modern times was Charles H. Stratton—

"General Tom Thumb"—who at the age of twenty-five was thirty-one inches in height. Unlike giants, dwarfs usually show no signs of mental weakness and are often, on the contrary, exceptionally bright. They are in many cases, too, perfectly proportioned; but some physical abnormality usually accompanies dwarfism.

DWARFING, the process of training up trees or shrubs for ornament in houses, so as to cause them never to reach more than a very small size, by keeping them in poor soil, giving them little water and pinching off strong shoots. Formerly dwarfing was practiced only by the Chinese and Japanese, for producing ornamental shrubs, but it is now common among fruit growers and on coffee plantations. Fruit trees are often dwarfed by grafting the cion upon a slow-growing trunk. Coffee trees are kept trimmed to increase the number of small branches upon which the fruit is borne. See **GRAFTING**.

DWIGHT, TIMOTHY (1752-1817), an American divine, born in Massachusetts. His father was Col. Timothy Dwight, and his mother a daughter of Jonathan Edwards. He served as chaplain in the Revolutionary army and ultimately became president of Yale College. His *Theology* (1818) was for long a standard, both in Great Britain and America. He was the author of two poems the *Conquest of Canaan* and *Greenfield Hill*, besides numerous unimportant works, consisting of dissertations and occasional sermons. A grandson, Timothy Dwight, was elected president of Yale in 1886 and was a member of the American committee for the revision of the English version of the Bible.

DYAKS, the aborigines of Borneo, inhabiting the interior of the island. They are a finely formed race, of a yellow complexion, and are described as docile, industrious and superior to the Malays, whom they exceed in stature and often in good looks. The more advanced of them practice agriculture and live in neatly-constructed and fairly-comfortable houses. Hunting their enemies to make trophies of their heads was formerly a favorite pastime among them, but this has been abolished where European influence prevails.

DYEING, *dying*, the art of fixing a new and permanent color on textile fabrics, usually cotton, linen, silk and wool. All fabrics must be thoroughly cleaned before being placed in the dye. Cotton and linen being placed in the dye. Cotton and linen fabrics go through a prolonged series of oper-

ations in bleaching. Silk is boiled in a solution of fine soap to remove the fatty matter, and wool is cleansed by scouring in weak soap or soda lye or weak ammonia.

The process of dyeing varies much according to the stuff and the coloring matters used. In general, animal fibers, like silk and wool, combine more easily with most colors than vegetable fibers, such as linen and cotton. In the case of the former, for example, a simple immersion in aniline dyes is sufficient to produce a fixed color. Some dyes will not unite directly with the fibers so as to produce a good and permanent color. These dyes require the intervention of another agent to fix them on the different stuffs, and the name *mordant* is applied to those substances which are employed to make the stuff to be dyed and the dyeing color combine. Alum, acetate of alumina, chloride of tin, salts of iron, albumen, gluten and tannin are common mordants. The mordant is generally dissolved in water, into which the stuffs to be dyed are plunged. In some cases it is mixed with the color, and both are applied to the stuff at the same time. An important characteristic of mordants is their power of affecting the natural tint of the dye and thus enabling a variety of shades to be produced at small expense. Thus, nitrates tend to give a yellow tinge to the colors; alumina deepens and oxide of tin brightens the natural tints.

Dyestuffs, the materials from which different colors are obtained. They are divided into two classes, natural and artificial. Among the former are indigo, safflower, annatto, cochineal, logwood and fustic. Of much greater commercial importance than any natural dyestuff is coal tar, the source of aniline dyes. It was announced in 1917 that a method had been discovered and patented for using the colors of autumn leaves for dyes. In Argentina a new dye material called *algarrobin* was used for dyeing khaki cloth. This was made from the wood of the carob tree.

The American Dye Industry. Previous to the World War Germany had a monopoly of the coal-tar industry, as only German manufacturers understood the process of converting the products of coal-tar distillation into the "intermediate" substances from which the dyes were made. In America the industry was represented by a few scattered establishments in which the imported

intermediates were assembled into finished dyes. The outbreak of the war and its prolongation changed the situation completely.

When the German merchant marine was driven from the seas and importations from Germany ceased, American manufacturers were thrown on their own resources. As a result the independent American dye industry came into being, and the period of dependence on German products was at an end. By the first of January, 1919, \$100,000,000 had been invested in the dye industry in the United States, and 200 dyes had been created from American raw materials and intermediates. These dyes are the equal of foreign pre-war products.

Related Articles. Consult the following titles for additional information:

Alizarin	Coal Tar	Mordants
Aniline	Cochineal	Safflower
Annatto	Galls	Sloe
Bleaching	Indigo	Turmeric
Carmine	Logwood	Wood

DYNAMICS, that branch of physics which deals with the laws of force. Under the same conditions any physical force produces the same effects as any other equal physical force. Force is measured by its effect upon matter, for the resistance which a body offers to a force tending to set it in motion is directly proportional to the amount of matter in the body, that is, to its mass. For instance, a body that weighs ten pounds offers ten times as much resistance as a body weighing one pound. The two basic units by which force is measured are the *poundal*, so called in the English system, and the *dyne*, in the metric system. See **DYNE**.

The science of dynamics is founded almost entirely on three principles, known as Newton's Laws of Motion. These are.

(1) A body at rest remains at rest, and a body in motion moves with uniform velocity in a straight line, unless acted upon by some external force.

(2) The change of momentum of a body is proportional to the amount of force acting and to the length of time during which it acts and is in the same direction as the force.

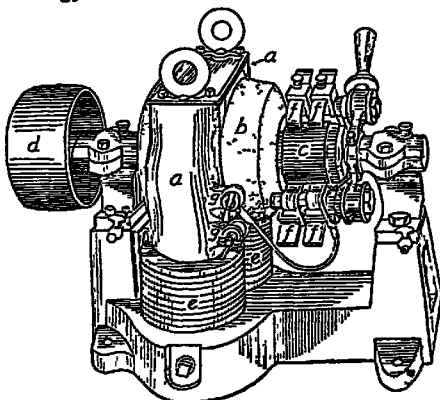
(3) The action of every force is accompanied by an equal reaction in the opposite direction.

Dynamics is usually divided into *statics*, which treats of force which does not result in motion, and *kinetics*, which treats of force resulting in motion. Under statics

belongs the study of the forces caused in the different parts of a bridge by the weight of an automobile crossing the bridge and of the conditions under which a lever will be balanced on a pivot. Under kinetics scientists study the paths which bullets and shells follow, the behavior of gyroscopes, and the relation between the speed of rotation of a wheel and the centrifugal force at any point.

DYNAMITE, an explosive substance, made by soaking wood pulp, infusorial earth, gun-cotton or other absorbent material in nitroglycerine. The most powerful variety is made by dissolving cellulose nitrate in nitroglycerine, and mixing the solution with wood pulp and a little potassium nitrate. This variety is put up in cartridges, in the form of sticks eight inches long and one and one-half inches in diameter. Dynamite is used under various names, such as giant powder, rend-rock and Hercules powder. It is employed in blasting. This explosive was invented by A. Nobel in 1886. Though its force is thirteen times that of ordinary gunpowder, it is surpassed in power by others of more recent discovery. See **EXPLOSIVES**.

DYNAMO, *dī'na mo*, or **DYNAMO ELECTRIC MACHINE**, a machine for generating electricity by the expenditure of mechanical energy. It is so constructed that when driven



MODERN DYNAMO

a, field magnet; b, armature; c, commutator; d, wheel for belt; e, field coils; f, brushes; g, terminals

by mechanical power (*d* in the illustration) an electro-motive-force is developed in the machine. The necessary parts of a dynamo are a field magnet, an armature and a commutator.

The following is a description of a simple direct-current dynamo: The *field magnet* is an electromagnet used to produce a region of magnetic force in which the current is generated (see *a* in the illustration). It consists of coils of wire (*e, e*) wrapped around iron cores of the most effective shape. The passage of a current of electricity through these coils from an outside source or from the dynamo itself produces a powerful magnetic field between their poles (*a, a*).

The armature (*b*) is a core of soft iron on which insulated wire is wound. It is supported in bearings and driven by a belt on a pulley (*d*). The armature rotates in the magnetic field between the poles of the field magnet, and the electromotive force which causes the current to flow is caused by its wires moving across the field.

Since each wire on the armature moves up and then down through the field, an alternating current is generated in the armature wires. The commutator (*c*) changes this to a direct current. It consists of a ring of copper segments insulated from one another and individually connected to the wires which pass around the armature. Copper or carbon brushes (*f, f*) rest on the segments at opposite points and carry off the current. Conductors lead to the main terminals of the machine (*g, g*), from which current is carried on wires to furnish power.

All dynamos operate on the same principle, but there are many variations in design to adapt them to different conditions. If alternating current is to be produced in a rotating armature, the armature wires are connected to solid rings on the shaft instead of to commutator segments, and the brushes rest upon these rings. In most of the large alternating current dynamos, the field magnets rotate inside a stationary armature, thus generating a current of high voltage which may be led off without passing through the sliding contacts made by brushes.

The voltage (see *VOLT*) of a generator depends upon the speed at which the armature is rotated, upon the strength of the magnetic field and upon the number of turns of wire in the armature.

The two largest generators ever constructed are in the Hell Gate power station of New York City and produce 215,000 horse power each. In Niagara Falls, N. Y.,

are three of the largest generators driven by water power, each one giving 70,000 horse power. Water to drive these machines is taken from the Niagara River above the falls. See *ELECTRO-MOTIVE FORCE; ELECTRICITY; HORSE POWER*.

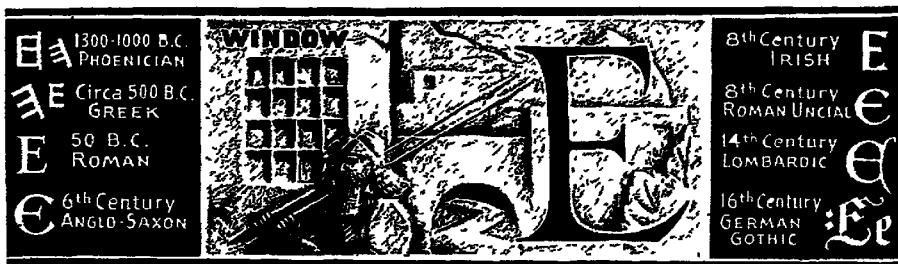
DYNAMOMETER, a device for measuring force exerted, as by an animal or a machine in doing work. One sort of dynamometer consists of a spring balance, fitted with a scale and an index. If the instrument were hung up and weights suspended on it, the weight would be shown by the indicator. Made a link in the draught chain of a plow, the dynamometer indicates in the same way the intensity of the strain, or force expended. The instrument can be made to measure not only force, but also the distance through which it acts and the time during which it is exerted.

DYNE, the basic unit of force in the metric or centimeter-gram-second system of measurement. A dyne is that force which, by acting for one second on one gram of matter, will cause a change of one centimeter per second in its velocity. The dyne is a very small unit, being about 1/980 of the pull of gravity on a gram of matter. The *megadyne*, equal to one million dynes, is frequently used instead of the dyne. See *DYNAMICS*.

DYSPEPSIA, *dis pep'si a*, a distressing ailment that afflicts a large portion of the human race with varying degrees of severity. It is another name for indigestion, and means, literally, *hard to digest*. Its causes are numerous—overeating, eating too fast, eating too much of one kind of food, indulging in too rich a diet, constipation, worrying while at the table, etc. Headache, nausea, a feeling of weight in the stomach and cramps are common symptoms. A dyspeptic person must find the cause of his trouble and then change his habits. Eating slowly, selecting a well-balanced diet of well-cooked, simple foods, dismissing cares from the mind while eating, avoiding tea, coffee and liquor and observing moderation in all things are good rules to follow.

Related Articles. For suggestions regarding the properties of food and other topics bearing on the subject consult the following titles

Calorie	Domestic Science
Carbohydrate	Fletcherizing
Constipation	Food
Cookery	Mastication
Diet	Physical Culture
Digestion	Physiology



E, the second vowel and the fifth letter of the English alphabet. It occurs more frequently in English words than any other letter of the alphabet. In English its long or natural sound, as in *me*, coincides with the sound of *é* in the Italian and French languages. It has also another principal sound, a short one, heard in *met*, *men*. It has, besides, a sound like *a* in *bare*, as in *there*, and the obscure sound which is heard in *her*. As a final letter in English it is generally silent, but it serves to indicate that the preceding vowel is to have its long sound, as in *mane*, *cane*, *plume*. When two *e*'s come together the sound is generally the same as that of the single *e* long, as in *deem*, *esteem*, *need*. In form it is almost the same as in the earliest Greek

In music, **E** is the third note in the diatonic scale of C.

EADS, *eadz*, JAMES BUCHANAN (1820-1887), an American engineer, born at Lawrenceburg, Ind. He became famous for his skill in designing and constructing of the famous Eads Bridge over the Mississippi River, connecting Saint Louis and East Saint Louis. It is considered one of the finest bridges in the world. Following this was his construction of the jetties at the mouth of the Mississippi, by which the channel of the river was kept clear to a depth sufficient to permit the navigation of the largest ocean-going vessels. This was a new departure in American engineering and met with disfavor at first, but Mr. Eads's faith in his plan was so great that he offered to build the jetties at his own expense upon the condition that should they be satisfactory he should be paid for the work. They met every expectation. He was the first American to receive the Albert medal, conferred by the British Society for the Encouragement of Arts, Manufactures and Commerce. See **JERRY**.

EAGLE, *é'g'l*, a bird of prey which has been invested with a historical and literary background and a halo of romance. It is related to the hawks and the falcons. The



HEAD AND FOOT OF BALD EAGLE

name has become a synonym for strength, endurance and majesty. In a measure its reputation is deserved, yet it is not the most powerful of birds; it has not the keen vision of some others; its habits are not always those popularly associated with the noblest of birds.

"Bird of the broad and sweeping wing,
Thy home is in high heaven,"

says Peruvial, in *To The Eagle*, thus crediting the bird with wondrous power of flight; it flies to greater heights than any other bird except the condor. In point of courage the eagle probably has no equal in all the feathered family, and it is this characteristic, combined with long life, majestic mien and piercing eye, which since ancient times has given it attributes of greatness.

So high does the eagle soar that the old Romans fancied it to be a messenger from the gods, so they placed it at an early date upon their national standards (see **EAGLE**, military standard). Milton, in *Paradise Lost*, voiced the Roman legend in

"The bird of Jove, stoop'd from his aery tour"

The eagle, on the other hand, is a thief. No objection exists to diet of rabbits and other small wild animals, but it swoops down upon agricultural districts and carries poultry and even lambs to his nest. It has been known to attack even larger animals. Then, too, the eagle, like the condor, eats dead and decaying flesh, but lacks much of the foulness of the latter bird. It searches for dead fish along shores of lakes and ocean, and often robs other birds of fish they have



GOLDEN EAGLE

caught. The nest is built coarsely of sticks, on crags on rocky ledges, nearly always in-

accessible to man, and two or three dull-colored eggs are laid.

Kinds of Eagles. Birds of the typical genus have long and powerful bills, the upper mandible curved sharply over the lower, have wings reaching to the tip of the tail and legs feathered to the toes. The *golden eagle* is common through Europe, Asia and northern Africa. It measures over six feet from tip to tip of the expanded wings, and three feet from the beak to the end of the tail. The body is brownish, the feathers of the head and neck pointed and of a golden hue. The national emblem of the United States is the *bald eagle*, one of the fishing eagles, which takes its name from the fact that in mature birds the head and neck are white. It is a handsome animal which has an air of great nobility, especially upon the wing. If left undisturbed, bald eagles will return to the same nest year after year.

Eagles live to an average age of a hundred years.

EAGLE, a gold coin of the United States, of the value of ten dollars. It was first coined in 1795. There are also half-eagles, quarter-eagles and double eagles, of proportionate values. The \$2 50 gold coin is no longer minted.

EAGLE, *THE*, as a military standard made its first appearance in Persia, where it was borne on the top of a spear. The Romans, who adopted the emblem in 104 B. C., made similar use of it. Their eagle was about the size of a pigeon and was sometimes made of gold, sometimes of silver. The national emblem of the United States, the bald eagle with wings extended, was adopted in 1785.

FAMES, *aims*, **EMMA** (1837-), whose family name was **EMMA HAYDEN**, is an American operatic soprano, born in Shanghai, China. She was taken to America in 1872, and later she studied music in Boston. After thorough study subsequently in Paris she made her debut there as Juliet, in 1889. Two years later she married Julian Story, an artist. Her beauty, stage presence, fine acting and superb voice made her one of the most conspicuous operatic figures of the last generation. She has retired from the stage.

In 1907 she was divorced from Story, and four years later was married to the baritone Emilio de Gogorza. Her home for several years has been in Paris, France.



EAR, *eer*, the organ of hearing, a wonderful mechanism that is one of the most precious possessions of mankind. Not until a person has lost the sense of hearing does he realize what that sense means to his daily comfort and happiness. To live in absolute silence is to be cut off from a great part of the ordinary intercourse of human beings. It is therefore of practical value to understand the mechanism of the

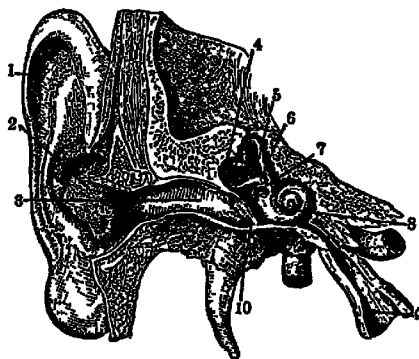
ear, and to know how to protect this organ from injury. In man and all higher orders of animals the ear consists of three divisions, the external ear, the middle ear and the internal ear.

The **External Ear**, or *Concha*, consists of the auricle, or visible ear, and the auditory canal. In many animals the external ear is movable, but in man it is usually immovable in so far as voluntary movement is concerned. The human external ear consists of cartilage, skin and a thin, muscular coat and has a peculiar form. The outer rim is known as the *helix*, and the structure is so shaped as to attract sound waves into the auditory canal, which is a passage leading to the membrane separating the external from the middle ear. This is known as the membrane of the *tympanum* or eardrum, and is a circular membrane stretched across the inner end of the auditory canal, its rim being attached to the bone forming the walls of the tympanum. The membrane contains a number of muscles, some of which are joined to the bones of the middle ear, and its inner surface is lined with a mucous membrane.

The **Middle Ear**, or *Tympanum*, is a cavity filled with air, which enters it through the Eustachian tube. It contains three small bones known as *ossicles*. From their peculiar shape these bones are called the *hammer*, the *anvil* and the *stirrup*. The hammer consists of a head, neck and handle, the last being attached to the eardrum. The anvil has a concave surface into which the head of the hammer fits, and the stirrup at one end is joined to the anvil, and at the other to the vestibule of the internal ear. These bones

are so placed as to transfer the vibrations of the eardrum to the internal ear.

The **Internal Ear**, or *Labyrinth*, is located in a small cavity in the temporal bone, and is divided into the vestibule, the semicircular canals and the cochlea. The vestibule is a small triangular cavity between the semicircular canals and the cochlea. The base fits into the opening which connects this with the middle ear. The *semicircular canals* are three in number and occupy vertical, oblique and horizontal positions, as shown in the diagram. Each connects with the vestibule by two openings. The *cochlea* or *snail shell* is a gradually tapering canal winding two and one-half times around a central bony axis. The cavity of the cochlea is divided into two passages by a structure called the *basilar membrane*. Supported on this is the so-called *organ of Corti*, which is formed of cells and rods which extend throughout the cochlea. The organ of Corti and the membrane form a series of vibrating cords equipped with an apparatus by which vibrations from the bones of the ear are transformed into nerve impulses. The cords are



SECTION THROUGH RIGHT EAR

1, helix, 2, concha, 3, outer passage, 4, 5, 6, semi-circular canals, 7, oval window, 8, cochlea, 9, Eustachian tube; 10, eardrum

very delicately adjusted, and they respond to vibrations that range in speed from thirty to about 20,000 per second.

Hearing. Hearing involves both physiological and mental action. For the production and transmission of sound, see **SOUND**. The external ear collects the sound waves and reflects them to the auditory canal, where they strike against the eardrum, which they cause to vibrate. By means of the bones in the middle ear the vibrations of the eardrum are

Outline on the Ear

I. FUNCTION

II. POSITION

III. ANATOMY

(1) External ear or concha

- (a) Shape
- (b) Composition
 - (1) Cartilage
 - (2) Muscular coat
 - (3) Skin

(c) Parts

- (1) Helix
- (2) Tragus or protecting flap
- (3) Lobule

(d) Functions

- (1) Collect sound waves
- (2) Concentrate them on eardrum

(2) Middle ear or tympanum

- (a) Situation
- (b) Size
- (c) Parts

(1) Membrane or eardrum

- (a) Position
- (b) Composition
- (c) Function

(2) Cavity

- (a) Filled with air
- (b) Ossicles
 - (1) Number
 - (2) Names
 - (3) Arrangement
 - (4) Action
 - (5) Function

(3) Eustachian tube

- (a) Definition
- (b) Function

(d) Function

- (1) Transmission of vibration to internal ear

(3) Internal ear or labyrinth

(1) Divisions

- (a) Vestibule
- (b) Semicircular canals
- (c) Cochlea
 - (1) Basilar membrane
 - (2) Organ of Corti

IV. PROCESS OF HEARING

- (1) Sound waves collected
- (2) Reflected to auditory canal

(3) Concentrated against drum

(4) Transmitted to internal ear

(5) Action of organ of Corti

(6) Work of auditory centers in brain

V. CARE OF THE EAR

Questions on the Ear

What is the ear?

What is the external ear? What separates it from the middle ear?

What substances make up the outer ear?

What are its important parts? Describe each.

What are its functions?

Describe the eardrum and the manner in which sound is transmitted to the middle ear.

Name the three bones of the middle ear.

Describe their action.

Where is the middle ear?

What is the Eustachian tube?

What is the internal ear?

What is the cochlea?

What is the function of the semi-circular canals? How are they connected with the vestibule?

What is the organ of Corti?

Of what is it composed?

Trace the transmission of sound from the outer ear to the brain.

What kind of an act is the final act of hearing?

State three ways of influencing the propagation of sound to the tympanum.

What are the names of the nerves of hearing?

Of what use is the fluid in the internal ear?

What parts of the inner ear operate in the same way as the strings of a piano?

What regulates the tension of the eardrum?

How are we enabled to recognize such a variety of sounds?

What is the educational value of training the sense of hearing?

How does the study of instrumental music develop the sense of hearing?

intensified and at the same time transmitted to the internal ear at the vestibule. Here they set up vibrations in the fluid. The strings and rods in the organ of Corti, which can vibrate in harmony with these vibrations, respond just as do the strings of a piano that produce a note sung near the instrument. The vibrations in the organ of Corti stimulate the sensitive fibers of the auditory nerve connected with the vibrating rods, and the nerve impulses thus created are carried to the auditory centers of the brain, by which they are translated into sound. Hence, the final act of hearing is a mental act.

The muscles of the middle ear regulate the tension of the eardrum so that it can respond equally well to vibrations that produce high or low tones, and the large number of rods and pillars of the organ of Corti enable us to recognize a multitude of sounds.

Care of the Ear. The internal apparatus of the ear is one of the most delicately-adjusted structures in the body, and one that should be carefully protected. The ears of children should be watched for signs of trouble. Earache and running ear, common ailments of childhood, should not be neglected, nor should home remedies be attempted. Many children have suffered irreparable injury because of neglect. Ear specialists should be consulted in all such cases, and especially after attacks of measles or scarlet fever. These diseases are the source of countless cases of deafness. Colds and nasal catarrh are also responsible for much ear trouble. They cause catarrh of the middle ear, which is one of the most difficult ailments to check. Children should be warned, also, not to pick their ears with sharp instruments, or to put their fingers in the ear. Boxing the ears of children is one of the most harmful practices known, as a severe blow may break the eardrum.

EARL, *ur*l, a nobleman in Great Britain, originally the viceroy of one of the four mediæval divisions of England. The title to-day is simply honorary, signifying noble rank, and carries no jurisdiction. The king can bestow the rank on any deserving subject. The earl ranks below the marquis and above a viscount. It corresponds to the *comte* in France, which is the equivalent of the old Norman *count*, and therefore the wife of an earl is called *countess*.

EARLY, *ur*ly, JUBAL ANDERSON (1816-1894), an officer in the Confederate army.

He was born in Franklin County, Va., and was graduated at West Point in 1837. He served in the Florida and Mexican wars, then adopted the law as a profession and was a member of the state legislature. Although firmly opposed to secession, he was true to his state and entered the Confederate army as colonel. At the first battle of Bull Run he was instrumental in saving the day for the Confederates, and he fought in the battles of Fredericksburg, Chancellorsville and Gettysburg. He also commanded in the Shenandoah Valley, where he was defeated by Sheridan. His lack of success compelled General Lee to remove him from command, but many military critics place him next to Lee and Jackson among the Confederate soldiers.

EAR-RING, an ornament of very ancient origin, worn on the ear. Earrings were worn by ancient Egyptians, Assyrians, Greeks and Romans. Among the earliest people they were restricted to royalty of both sexes and were a sign of rank. Among the Greeks and Etruscans they were commonly worn by women, and it is they who to-day monopolize the custom in every part of the civilized world where it still survives.

EAR SHELL. See **ABATONE**.



EARTH, *ur*th, the sixth in size among the nine planets of the solar system, and the only one about which we have detailed information. The earth is attended by one satellite, the moon, and is surrounded by a gaseous envelope, the atmosphere. Only Venus and Mercury among the planets are nearer the sun than is the earth.

Shape. To an observer whose view is not obstructed, any part of the earth presents itself as a circular and horizontal expanse, on the circumference of which the heavens appear to rest. Accordingly, in remote antiquity the earth was regarded as a flat, circular body, floating on the water. But even in antiquity the spherical form of the earth began to be suspected. It is only on this supposition that we can explain why the horizon of vision grows wider and wider the higher the position we choose, why the tops of towers and mountains at a distance

become visible before the bases, why the hull of a ship disappears first as it sails away, and why, as we go from the poles toward the equator, new stars become visible. Besides these proofs there are many others, such as the circular shadow of the earth seen on the moon during an eclipse, the gradual appearance and disappearance of the sun, and, lastly, the fact that since 1519 it has been regularly circumnavigated.

The earth is not, however, an exact sphere, but is very slightly flattened at the poles, so as to have the form known as an *oblate spheroid*. In this way the *polar diameter*, or diameter from pole to pole, is shorter than the diameter at right angles to this—the *equatorial diameter*. The most accurate measurements make the polar diameter about twenty-seven miles less than the equatorial, the equatorial diameter being found to be 7,926.6 miles, and the polar, 7,899.9.

Surface Lines. The earth is regarded as divided into halves—the northern and the southern hemisphere—by the *equator*, an imaginary line passing around it midway between the poles. In order to indicate with precision the position of places on the earth, additional lines are imagined to lie on the surface in such a manner that those of one set all pass through both poles, while those of the other are drawn parallel to the equator. The former are called *meridians*, the latter *parallels of latitude*, and by them we can tell the latitude and longitude, and thus the exact position of any place on the earth's surface.

Density. Many experiments by various methods have been made in order to determine the average density of the earth, that is, the quantity of matter it contains, and from them it has been calculated that the density of the earth is about five and one-half times that of water.

Motions. The earth, in common with the other planets, moves around the sun, completing its revolution in about $365\frac{1}{4}$ days, our *common year*; or exactly 365 days, 9 hours, 9 minutes and $9\frac{1}{2}$ seconds, making the *sidereal year*. The orbit of the earth is an ellipse, with the sun in one of its foci. Hence, the earth is not equally distant from the sun in all parts of the year, but is about 3,000,000 miles nearer at one time than at another, its least distance, according to recent calculations, being 89,897,000 miles, its greatest 92,963,000, and

the mean distance, or half the length of the long axis of the orbit, 91,430,000 miles. From this it may be calculated that the velocity of the earth in its orbit is about seventeen miles a second. In the winter of the northern hemisphere the earth is nearest the sun and in summer farthest from it; for the difference in the summer and winter temperature is not occasioned by the greater or less distance of the earth from the sun, but by the more or less oblique direction of the sun's rays. The passage of the earth around its orbit causes the sun to appear to describe a similar orbit in the heavens; and hence it is that at one time of the year one group of stars is seen in the neighborhood of the sun at sunrise and sunset and at another time another group. This apparent path of the sun is the *ecliptic*, and corresponds with what would be the path of the earth as seen from the sun; and the groups of stars through which the sun successively passed form the *zodiac*.

The earth's daily motion about its own axis takes place, according to mean time, in twenty-three hours, fifty-six minutes and four and one-tenth seconds. The axis on which the earth performs its rotation is inclined towards the plane of its path about the sun at an angle of $23\frac{1}{2}^{\circ}$. The sun ascends in the heavens from March 21 to June 21 (the summer *solstice*), about $23\frac{1}{2}^{\circ}$ above the equator toward the North Pole, and descends again toward the equator from June 21 to September 23; it then sinks till December 21 (the winter *solstice*), about $23\frac{1}{2}^{\circ}$ below the equator toward the South Pole, and returns again to the equator by March 21. This arrangement is the cause of the seasons and of the inequality of day and night attending them. For all countries lying beyond the equator, day and night are equal only twice in the year (at the *equinoxes*).

At the summer solstice the North Pole of the earth is turned toward the sun, and the South Pole away from it, and for $23\frac{1}{2}^{\circ}$ about the North Pole there is a period of longer or shorter duration during which the sun is continually above the horizon for more than twenty-four hours, while round the latter is an equal extent of surface within which the sun for similar periods is below the horizon. The reverse condition holds at the winter solstice. The circles bounding these regions are called respectively the *Arctic* and the *Antarctic Circle*, and the re-

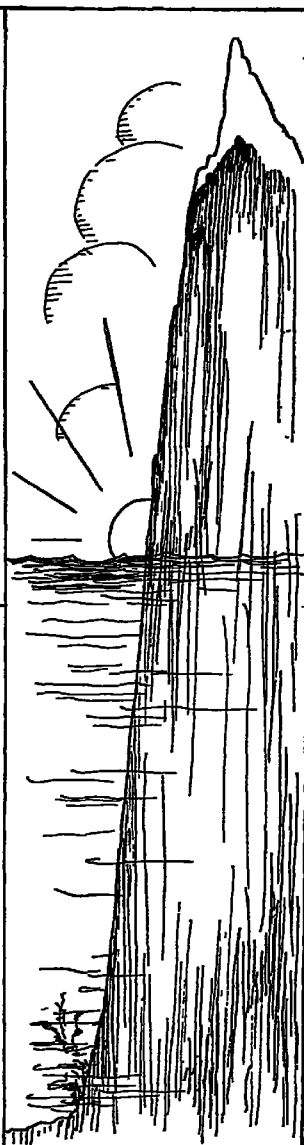


If the waters of the Atlantic should disappear



If the waters of the Pacific should disappear

THE EARTH WITHOUT WATER
as imagined by the artist



The distance between highest mountain top and lowest ocean depth is about $11\frac{1}{2}$ miles or $1/700$ of the earth's diameter.

Interesting Facts About The Earth

Statistics are given mainly in round figures, as sufficiently accurate for comparative study.

The Earth:

Total area 196,950,000 sq. m.
Land area 57,510,000 sq. m.
Ocean area 139,440,000 sq. m.

Area of Continents:

Asia . . . 17,000,000 sq. m.
Africa . . 11,500,000 sq. m.
North America
 8,000,000 sq. m.
South America
 6,800,000 sq. m.
Europe . . 3,750,000 sq. m.

Area of Oceans:

Pacific . . 68,634,000 sq. m.
Atlantic . . 41,321,000 sq. m.
Indian . . 29,340,000 sq. m.

Population of Continents:

Asia 950,000,000
Europe . . . 550,000,000
N. & S. America 230,000,000
Africa . . . 150,000,000
Australia . . 7,000,000
Total Earth (about)
 2,000,000,000

Circumference of Earth:

At equator . . 24,902 m.
At meridian . . 24,860 m.

Diameter of Earth:

Through equator 7,926.6 m.
Through poles . 7,899.9 m.

Highest Mountain:

Mt. Everest . . 29,141 ft.

Greatest Ocean Depth:

Between the Philippines
and Japan . . . 34,210 ft.

Highest Mountain of Each Continent:

Asia—
 Mt. Everest . . 29,141 ft.
So. America—
 Mt. Aconcagua 22,834 ft.
No. America—
 Mt. McKinley . 20,300 ft.
Africa—
 Mt. Kilimanjaro 19,710 ft.
Europe—
 Mt. Elbrus . . 18,465 ft.

Longest Rivers:

Mississippi-Missouri
 4,200 m.
Nile 4,000 m.
Amazon 3,900 m.
Ob 3,200 m.
Yangtze 3,100 m.

Largest Cities:

London 8,202,818
New York . . . 6,930,446
Tokyo 4,978,390
Berlin 4,300,000
Moscow 3,663,300
Chicago 3,376,438
Paris 2,871,039
Osaka 2,453,573
Buenos Aires . 2,153,200

gions themselves the *polar*, or *frigid*, *zones*. Throughout a region extending to $23\frac{1}{2}^{\circ}$ on each side of the equator the sun is directly overhead at every point in succession twice in the year. The circles which bound this region are called the *tropics*, that in the northern hemisphere being the tropic of *Cancer*, that in the southern the tropic of *Capricorn*, while the region between is the *torrid zone*. The regions between the tropics and the polar circles are respectively the *north* and *south temperate zones*.

Surface. The surface of the earth contains over 196,000,000 square miles, of which over two-thirds consists of water. The land is arranged into masses of irregular shape and size, the greatest connected mass—Europe and Asia—being in the eastern hemisphere. The chief masses receive the name of continents; detached masses of smaller size form islands. The surface of the land is variously diversified, exhibiting mountains, valleys, plains, plateaus and deserts. The water area of the earth is divided into oceans, seas, bays, gulfs and sounds, while rivers and lakes may be regarded as features of the land surface. The great phenomena of the oceans are currents and tides.

Interior. From the evidence furnished by volcanoes, hot springs and the sinking of mines, it is known that the earth has a high internal temperature of its own. Taking the average of the various observed rates of increase, this temperature seems to increase 1° F. for every sixty feet of descent. Assuming this to continue, the rocks at a depth of two miles would be as hot as boiling water, and at a depth of fifty miles the heat would be such as at the surface would melt every known solid. This being so, various theories as to the internal condition of the earth have been proposed:

(1) That a thin envelope or crust surrounds a molten interior. It can be shown, however, that as tides must be produced in such a molten mass the cool outer crust would be unable to withstand the enormous force of these unless it were about 2,000 miles thick.

(2) That the interior is solid, with spaces here and there filled with liquid or gaseous material. This theory assumes that there are within the earth enormous cavities filled with molten rock, which escapes, when local pressure is removed, in the form of volcanic outbursts.

(3) That the earth consists of a thin crust, a large solid nucleus, and a liquid film between the nucleus and the crust. The temper-

ature at the center being not much greater than comparatively near the surface.

(4) That the earth is solid to the center, but any part may become liquid if local pressure is removed.

We know that if the pressure on a solid be increased the melting point is correspondingly raised; now the pressure at the center of the earth, or even at the depth of fifty or one hundred miles, must be enormous, and probably is so great as to keep the rocks there permanently in a solid condition, notwithstanding the heat. This last theory is considered the most probable. On the supposition of its correctness, volcanoes might be explained by supposing that at certain points here and there pressure is removed by the elevations of portions of the earth's surface which are constantly taking place, and that this allows the rocks to liquefy. Water may then soak down to these liquid rocks, and, being converted into steam, produce various volcanic phenomena.

Origin. The earth is believed by some authorities to have condensed and solidified from a gaseous or nebular condition, and to have once had a far higher temperature than now. If such were the case the outer surface, losing heat by radiation, would be the first part to cool quickly; while the interior, losing its heat by conduction, would not cool so rapidly, and therefore would naturally have a higher temperature than the portion at the surface. The theory of condensation from a hot gaseous state is a part of the nebular hypothesis (which see), originated by Laplace. It is not accepted by several modern scholars, as it has many inconsistencies. A more recent theory as to the earth's origin is called the *planetesimal hypothesis*. Scientists advocating this theory hold that nebulae consist of swarms of small bodies, some of which move in regular paths, like planets. *Planetesimal* means *tiny planet*. When a number of these revolving bodies are brought close together they gradually collect into large, compact masses, which grow larger as they gather up other planetesimals. In this way, according to the theory, the earth and other planets were formed.

Magnetism. Another feature that the earth as a whole presents is magnetism. When a magnetic needle is balanced on a point it remains at rest in one position only, pointing then nearly due north and south. This can be explained only on the supposition that the earth acts as a great magnet. It has,

in fact, two poles—a north and a south magnetic pole—which are not very far from, but by no means coincident with, the geographical poles. The north magnetic pole was located closely in 1905. There is also a neutral line or magnetic equator, which does not greatly diverge from the geographical equator. The earth acts upon all magnets as they act upon one another, and it is for this reason that they point north and south.

Related Articles. Consult the following titles for additional information

Astronomy	Latitude
Atmosphere	Longitude and Time
Antarctic Circle	Magnetic Equator
Apsides	Map
Arctic Circle	Meridian
Axle	Moon
Chart	Nebular Hypothesis
Climate	Ocean
Day	Physical Geography
Degree	Poles
Earth Currents	Solstice
Ecliptic	Standard Time
Equator	Stratosphere
Equinox	Sun
Geography (with list)	Tides
Geology (with list)	Time
Gravitation	Tropics
Hemisphere	Troposphere
Hydrography	Weather Bureau
International Date Line	Zodiac
	Zone

EARTH CURRENTS, natural electric disturbances of the nature of transient currents in the earth. Telegraph lines, and particularly long submarine lines, are constantly troubled by them. The origin and nature of earth currents are not thoroughly understood, but they are found to be very intimately connected with magnetic disturbances of the earth, called magnetic storms, and these, it is well known, are closely connected with the appearance of the aurora borealis and with the occurrence of spots on the sun. See **AURORA BOREALIS**.

EARTHENWARE. See **POTTERY**.

EARTHQUAKE, a movement of the earth's crust, caused by some internal convulsion. Three kinds of earthquake movements are generally recognized. These are the wave movement, the vertical movement and the circular, or twisting, movement. The first is the most common and extends over the largest areas. The *wave* movement begins at a center, from which it moves in all directions, like a wave started by dropping a pebble into a pool of water. The earthquake wave, however, differs from the water wave in this: the irregular resistance which it receives from the different layers of rock prevents its moving in a circle, so that its outline soon becomes very irregular. The velocity is very great, often reaching thirty

or forty miles a minute. These waves also move more rapidly in hard, elastic rock than in loose gravel or sand. The *vertical* movement acts like the explosion of a mine and usually throws masses of earth and rock into the air. The *circular* or *twisting* movement is the most destructive of all, but it is happily of least frequent occurrence and is confined to very small areas.

The causes of earthquakes are not well understood. Those in volcanic regions are evidently connected with volcanic action, and some are known to be caused by the eruptions which they precede; but those movements more or less remote from volcanic regions and extending over comparatively large areas, such as the earthquake at Charleston, S. C., in 1886, cannot logically be accounted for in this way. The most generally accepted view as to the cause of this sort of earthquake is that the movement of the earth's crust is caused by the contractions of cooling matter in the interior.

When the motion is violent and rapid, the destructive effects of an earthquake are very great. An upward movement of a quarter of an inch will crack brick walls, and one of half an inch will shatter them. When occurring on or near the seacoast, earthquakes often cause great destruction and loss of life by the unusually high waves which they produce in the sea. These roll inland and flood regions that under ordinary conditions are entirely free from the action of the sea. Sometimes large steamers are carried from their moorings and left upon dry land, buildings are destroyed, basins are flooded and hundreds of people are drowned. In some localities changes of level are produced by earthquakes, courses of streams are altered, springs are dried up and new springs are formed. Fortunately, most shocks are mild, and those of a severe nature seldom occur. The most noted earthquakes in the world's history are those at Lima in 1746; Lisbon in 1755, which caused the death of from 40,000 to 50,000 persons; Calabria in 1857; in Ecuador and Peru in 1868; at Charleston, S. C., in 1886; in Italy in 1887, and in Japan in 1891, 1914 and 1923.

The most destructive earthquake in the United States occurred in San Francisco and its immediate vicinity April 18, 1906. A large portion of the business part of the city was destroyed or so damaged as to make

rebuilding necessary. The destructive effects extended for 125 miles north and 80 miles south of the city. Several buildings of the Leland Stanford University were damaged or destroyed. The total loss of life was about 500, and over 1,500 people were injured. The total property loss was estimated at \$350,000,000. On August 16, 1906, several shocks occurred in South America. Valparaiso and Santiago, Chile, suffered serious damage and loss of life.

One of the greatest earthquake calamities known to history took place in Calabria, Italy, and the island of Sicily, December 28, 1908. The cities of Messina and Reggio were destroyed, together with many smaller towns along the coasts. The loss of life was estimated at from 120,000 to 150,000.

On January 13, 1914, occurred another great earthquake on the island of Sakura, Japan. A volcano which had been inactive for 150 years suddenly burst into activity, wiping out three towns and killing hundreds of people. In 1917 there were severe shocks in Central America. On June 7 the city of San Salvador, capital of Salvador, was nearly destroyed, and in December Guatemala City was completely laid in ruins.

Japan has suffered from earthquakes many times in its history, but the great disaster of September 1, 1923, overshadows all previous records in destructiveness. The region all along Tokyo Bay, including the great cities of Tokyo and Yokohama, and cities and villages between, were shaken down by earthquake, ravaged by fire, or scourged by tidal waves. The frail buildings were reduced to ruins, the property loss being probably over a billion dollars. The loss of life was fixed at 99,330.

EARTHS, a term applied to certain inodorous, unflammable, insoluble substances, of a moderate specific gravity, which constitute by far the greatest part of the gravel and soil that go to make up the mountains, valleys and plains of our globe. They include lime, baryta, strontia, magnesia, alumina and a few others. For a description of the substances named, see their respective titles.

EARTH SHINE, in astronomy a name given to the faint light visible on the part of the moon not illuminated by the sun. It is most conspicuous when the illuminated part of the disk is at its smallest, soon after

new moon, and is due to the light reflected upon the moon from the earth.

EARTHWORM, or **ANGLEWORM**, the popular name for long, creeping animals composed of many segments or rings, all of which are much alike. Earthworms represent about the lowest form of animal life. They move by contractions of successive parts of the body, aided by a double row of bristles on the under side. Their food consists of both vegetable and animal matter, and with it they swallow considerable soil. After digesting the food, they come to the surface of the earth and deposit the refuse and the soil in little heaps. Thus by turning the earth over and over, and by bringing fine rich soil to the surface, they are of great service to the farmer. When a heavy rain comes it fills the burrows and forces the worms to come to the surface. It is not true that they rain down. Earthworms are much used as bait by fishermen.

EARWIG, a name given in the United States to a small centipede, but more properly applied to an insect belonging to a group having leathery upper wings, gauzelike lower wings and long, delicate antennae, and armed on the abdomen with strong pinchers.



EASEMENT, *es'ment*, a right of use or enjoyment of lands belonging to another which one

EARWIG
a, larva; b, pupa, c, perfect insect

may possess through ownership or possession of other lands. Such are rights of way, the right of light, the right of drainage. Common law classifies easements as *positive*, or *affirmative*, and *negative*. The former refers to the right of physical use of another's land, as a right of way, while the latter requires no such physical use, as the right of light. If an easement is infringed or destroyed, the responsible party is guilty of a nuisance, and this may be abated by legal action or by the act of the person injured. If the offense does not amount to a nuisance, the offending party may be punished for trespass, while if the

infringement is only threatened, an injunction may be issued to restrain the acts.

EASTER, the festival commemorating the resurrection of Christ, observed in many branches of the Christian Church. By the first Christians it was regarded as continuing the feast of the Passover, at which the paschal lamb, a symbol of Christ, was sacrificed. Hence its name in Greek and in the Romance languages is taken from the Hebrew *pesach*, meaning passover.

The English name comes from the Anglo-Saxon *Eostre*, a goddess of light or spring, whose festival was celebrated in April. There was a long dispute in the Christian Church as to the proper time for holding Easter, the Christians of the East celebrating it on the same day as that on which the Jewish Passover fell, that is the fourteenth of Nisan, while the majority of the Church celebrated it on the Sunday next after this day. The controversy was decided by the Council of Nice in 325, which fixed Easter on the first Sunday after the full moon which happens upon or next after March 21. If the full moon happens on a Sunday, Easter is the Sunday after.

EASTER LILY, a plant whose waxy-white flowers are much used in churches when the festival of Easter is celebrated. The Easter lily is a stately plant. The stem bears a profusion of long, pointed, green leaves, and the flowers grow straight outward from the stalk. The varieties seen most frequently in America were brought from Bermuda, China and Japan. Though the last two naturally bloom later than the Bermuda lily, florists force early blossoming in hothouses.

EASTERN QUESTION, the name given to the diplomatic and national interests affected by the gradual retrocession of the Turkish Empire in Europe, and the problem of disposing of the territory thus left. As the Turkish dominions receded (see *TURKEY*), the new states of Bulgaria, Rumania, Serbia, and Montenegro attained importance, Greece was strengthened by territorial additions, and eventually the new state of Albania was created. The histories of these countries, coupled with the policies of the great European powers with respect to them, formed what was known as the Eastern Question.

Each of the great powers—Great Britain, France, Germany, Austria-Hungary, Italy, and Russia, sought to preserve a delicate bal-

ance of political power on the continent. Strong Balkan states, or the union of them into one strong group for political purposes, might with their alliances seriously impair the balances of power. Therefore each of the major powers sought to preserve its own influence in this group. Rather than add to the territory of any of these after the Balkan Wars (1912-1913), the new state of Albania was formed. The Crimean War, the Russo-Turkish War of 1877-1878, the Armenian massacres of 1896, and the Turko-Grecian War of 1897, are among the other notable events connected with the Eastern Question, prior to the World War (1914-1919). The result of the latter struggle brought entirely new complications to Europe.

EAST INDIA COMPANY, a trading company formed in London in 1590 and granted by the British government the monopoly of trade with India, China and the East Indies. The first charter, granted by Queen Elizabeth, conferred trading rights for a period of fifteen years. James I renewed the charter and made the right perpetual, reserving to the crown the right to recall it at three years' notice. Additional power was granted to the company of seizing and confiscating ships and goods of contraband traders, either in the British dominions or in any of the places where they were authorized to trade. The political rights which it held in India made possible oppressive rule there, and this led, in 1784, to the appointment of a Board of Control which supervised all acts of the company except the purely commercial.

In 1813 the charter was renewed, but this time the right to exclusive trade was confined to China, while the Indian trade was thrown open to all British subjects. The renewal of the company's charter again in 1834 took place in the face of stout opposition to their mercantile and even to their legislative privileges. In 1858 the government of India was vested directly in the Crown, and henceforth the Company existed only for the purpose of receiving payment of the dividends due upon capital.

EAST INDIES, the name loosely applied to India, Indo-China and the Malay Archipelago, including the Philippine Islands.

EAST LIVERPOOL, OHIO, in Columbiana County, forty miles northwest of Pittsburgh, Pa., on the Ohio River and on the Pennsylvania Railroad. It has extensive machine shops and glass factories, many

china, porcelain and terra cotta works, and the largest potteries in the world. The place was settled in 1798 as Saint Clair, and incorporated under its present name in 1834. There is a city park and a playground Population, 1930, 23,329.

EASTON, Pa., the county seat of Northampton County, on the Delaware River at its junction with the Lehigh, sixty-five miles north of Philadelphia, on the Lehigh Valley, the Lackawanna, the Pennsylvania and Central Railroad of New Jersey. The city has a local airport, and bus-line and interurban terminals. The hills of the town slope toward the river. There is a central public square, and the chief buildings include a Carnegie Library, a fine Federal building, an opera house and the buildings of a number of educational institutions, chief among which is Lafayette College, a leading Presbyterian college, and a business school. The chief industries include smelting furnaces, machine shops, shoe factories, planing mills, flour mills, silk mills and factories for the manufacture of automobiles, pianos, organs and other articles. The city is in the vicinity of an important coal region, and has a large trade. The government is on the mayor and council plan. Population, 1930, 34,468.

EAST ORANGE, N. J. See **ORANGE, N. J.**

EAST RIVER, a strait in New York, separating Manhattan and Brooklyn boroughs, and connecting Long Island Sound with New York Bay. It is ten miles long, and from one-half mile to three and one-half miles wide. The famous Brooklyn Bridge spans this river, and it is crossed by three other great suspension bridges. The lower section of East River is a part of New York Harbor. See **NEW YORK (city)**.

EAST SAINT LOUIS, Ill., the fourth city in size in the state, after Chicago, Peoria, and Rockford, in Saint Clair County, on the Baltimore & Ohio, the Chicago & Alton, the Wabash and seventeen other railroads, and on the Mississippi River, opposite Saint Louis, with which it is connected by two great bridges, two others are nearby. Coal is mined in the vicinity, and among the large industries are extensive rolling mills, malleable iron works, foundries, machine shops, locomotive works, grain elevators, fertilizer plants, glass factories and flour mills. The city contains one of the largest stockyards in the United

States, and the packing industry is important. The first bridge to be built across the river was the famous Eads Bridge, under construction from 1867 to 1874; besides the Eads, the Merchants' Bridge spans the river between the two cities, and the McKinley and Municipal bridges are available to the municipality. The city has more than sixty churches, one-fifth of them Roman Catholic. East Saint Louis was incorporated in 1865. Population, 1930, 74,347.

EAU CLAIRE, o klair, Wis., the county seat of Eau Claire County, eighty-four miles east of Saint Paul, Minn., at the junction of the Eau Claire and Chippewa rivers and on the Chicago, Milwaukee, St. Paul & Pacific, Chicago, St. Paul, Minneapolis & Omaha, and the "Soo Line". The city is at the head of light navigation on the Chippewa, and has good water power from both rivers. Manufacturing interests are extensive, products include automobile tires and tubes, paper boxes, refrigerators, pressure cookers, and railroad handcars. The city has a state teachers' college, a Carnegie Library, two hospitals, a large auditorium, and a sanitarium. Government is on the commission plan. Population, 1930, 26,287.

EAU DE COLOGNE, o de ko loné, a widely-used perfume, first made by an Italian who settled eventually in the German city of Cologne. It means, literally, *Cologne water*. The genuine perfume consists of purified benzoin, oil of lavender and oil of rosemary dissolved in alcohol, with various aromatic oils added until the desired fragrance is obtained. A number of excellent imitations are made.

EBENEZER, eb e né'zer, a word derived from the Hebrew for stone of help. The name was applied by Samuel to a spot where he set up a stone in token of God's help in a battle with the Philistines (*I Sam. VII, 10-12*). *Ebeneser* has come to be used as a symbol to express recognition of divine assistance, as in the following lines from the hymn *Come Thou Fount of Every Blessing*:

Here I'll raise mine Ebenezer,
Hither by thy help I'll come

EBERS, a'burs, GEORG MORITZ (1837-1898), a German Egyptologist and novelist. His scientific publications include *Egypt and the Book of Moses*; *Egypt, Description, Historical and Picturesque*, and *From Goshen to Sinai*. He is, however, most widely known

through his novels, the most popular of which are *An Egyptian Princess* and *Uarda*.

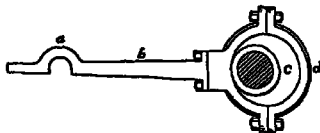
EBERT, FRIEDRICH (1871-1925), a German of obscure origin, who became first President of Germany under the provisional constitution adopted in February, 1919. Ebert was born in Heidelberg, the son of a tailor, and learned there the harnessmaker's trade. After taking up journalism he became editor of a Socialist newspaper, and in 1900 was elected Socialist member of the city council of Bremen. In 1905 he was given a seat in the central executive committee of the Social Democratic party, and in 1910 was elected to the Reichstag, the lower house of the German Parliament under the empire. Ebert supported the government during the World War, but he opposed the imperialistic aims of the militarists and the Treaty of Brest-Litovsk, by which Russia was to be dismembered.

On November 9, 1918, he succeeded Prince Maximilian as Chancellor, and on November 14 became Premier of the new democratic Cabinet. As head of the government he opened the first German National Assembly, which convened at Weimar on February 6, 1919. On February 11 the Assembly elected him first President of Germany, after adopting a provisional constitution. President Ebert was called upon to guide the German state through a troubled period, for the revolution which overthrew the empire was followed by serious uprisings among the radical Socialists, or Spartacists. He authorized severe measures against the disturbers, and in March hundreds of the rebellious element were executed. See **GERMANY**.

EB'ONY, the name given to the heartwood of various trees of different species, similar in that they all have wood of a dark color. The most valuable is the heartwood of a tree which grows in great abundance in the flat parts of Ceylon and is of such size that logs of its heartwood two feet in diameter and from ten to fifteen feet long are often procured. Other varieties of valuable ebony are obtained from the East Indies. Ebony is hard, heavy and durable, and admits of a fine polish or gloss. The most usual colors are black, red and green. The best is jet black, free from veins, very heavy, astringent, and of an acrid, pungent taste. On burning coals it yields an agreeable perfume, and when green it readily takes fire from its abundance of gum. It is wrought into toys,

piano keys and musical instruments, and is used for mosaic inlaid work and other ornamental purposes.

ECCENTRIC, *ek sen'trik*, a mechanical device for converting continuous circular motion into rectilinear motion. It consists of a disk attached to a shaft in such a way that

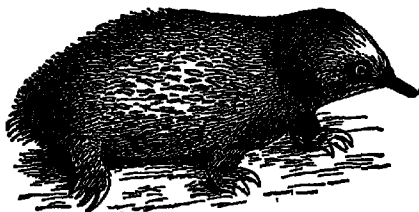


ECCENTRIC AND ATTACHMENTS
a, hook or gab, b, rod, c, eccentric, d, strap.

the center of the disk does not coincide with the center of the shaft. On the circumference of the disk is a hook to which is attached a rod. As the shaft and the eccentric revolve the hook is alternately raised and lowered, imparting a forth and back motion to the rod.

ECCLESIASTES, *ek kle se as'teez*, a book of the Old Testament, consisting of a series of discourses on the vanity of mortal things. The twelfth and last chapter begins with the famous admonition, "Remember now thy Creator in the days of thy youth," and contains a striking description of old age, written in language that is highly poetical. The title of the book is that by which the Septuagint translators rendered the Hebrew *Koheleth*, which means *preacher*. According to Jewish tradition, it was written by Solomon; but the best modern criticism has decided that its style and language, no less than its thought, belong to a much later date.

ECHIDNA, *e kid'nah*, or **SPINY ANTEATER**, a genus of Australian toothless mammals, in size and general appearance resembling a large hedgehog, excepting that the spines are longer, and the muzzle is long and slender, with a small opening at the end



ECHIDNA

through which a long, flexible tongue can be thrust. The echidna sleeps during the day.

It has short, strong legs and its five toes are armed with powerful claws so that it can burrow easily in the ground. It feeds upon ants and other insects, which it catches with its long, sticky tongue. It is nearly allied to the ornithorhynchus or duckbill, and the two form a peculiar class of animals, having in their structure some of the peculiarities that mark mammals, birds and reptiles.

ECHINODERMS, *ek'no durms*, one of the great divisions of the animal kingdom. The name means spiny-skinned, and was applied because of the long, needlelike projections on some species. Biologists rank them between insects and vertebrates. They include star fishes, brittle stars, sea urchins, sea lilies and sea cucumbers. The typical echinoderm has a disk-shaped body with arms which radiate like the spokes of a wheel, and it has a well-organized nervous system. The animal feeds through a round opening on the under side of the central disk on oysters, clams, seaweed and the like. There are about 3,000 species.

EOHO, *ek'ko*, in Greek mythology, a nymph who fell in love with Narcissus and because he did not return her love, pined away until nothing was left but her voice. See NARCISSUS.

ECHO, the repetition of a sound caused by the reflection of sound waves by some moderately even surface, as the wall of a building. The waves of sound on meeting the surface are turned back in their course. In order that the echo may return to the place from which the sound proceeds the reflection must be direct, and not at an angle to the line of transmission; otherwise the echo may be heard by others but not by the transmitter of the sound. This may be effected either by a reflecting surface at right angles to the line of transmission, or by several reflecting surfaces which end in bringing the sound back to the point from which it started.

Sound travels about 1,125 feet in a second (1,090 ft. at 32°F.). Observers standing at half that distance from the reflecting object will hear the echo a second later than the sound. Such an echo would repeat as many words and syllables as could be heard in a second. As the distance decreases the echo repeats fewer syllables, till only one is repeated. The most practiced ear cannot distinguish in a second more than from nine to twelve successive sounds, so that a distance of not less than sixty feet is needed

to enable an ordinary ear to distinguish between the echo and the original sounds. At a near distance the echo only clouds the original sounds, and thus often interferes with the hearing in churches and other large buildings. Woods, rocks and mountains often produce wonderful echoes, for which particular localities have become famous.

ECK, JOHANN MATER VON (1486-1543), a celebrated opponent of Luther. When he was trying to confuse Luther with quotations from the church fathers and councils, Luther quoted history and Scripture and finally said, "You run away from the Bible like the devil from the Cross." Eck at last made Luther declare that under certain circumstances it might be right to disobey the Pope and council. Eck then went to Rome (1520) and returned with a Papal bull against Luther, in attempting to publish which he met with violent opposition. In 1530, while at the diet of Augsburg, he made the remarkable admission that he could confute the Augsburg Confession by the fathers, but not by the Scriptures.

ECKENER, HUGO (1868-), a German authority on navigation of lighter-than-air craft and the most notable pilot of his time in the sailing of such ships. He first came to world prominence in 1924, when he delivered to the United States the *Z-R-2*, built in Germany for the American government by order of the Versailles Treaty. That ship on arrival was christened the *Los Angeles*. Subsequently, Eckener, in command of the *Graf Zeppelin*, sailed around the world (1929), and then pioneered regular sailings from Germany to Brazil; he made many more than a hundred voyages over this route, without accident. He did more than any other man to establish world faith in dirigibles. See DIRIGIBLE BALLOON.

ECLECTICS, *ek lek'tiks*, a name disparagingly applied to pseudo-philosophers who do not follow one system of philosophy in its entirety, but select from each what they find attractive. Those who are unable to follow an argument to its logical conclusion and thus piece together parts of several systems often are guilty of the most glaring inconsistencies. Every great philosopher exercises his selective insight, choosing his materials from all systems, but what distinguishes a great thinker from an eclectic is his desire to discover truth rather than that which he would like to believe true.

ECLIPSE, *e kleept'*, the hiding of one heavenly body by another or by the shadow of another. Stars and planets may suffer eclipse, but the only eclipse visible to the naked eye are those of the sun and the moon.

An *eclipse of the moon* is occasioned by the interposition of the earth between the sun and the moon; consequently, all eclipses of the moon happen at full moon; for it is only when the moon is on that side of the earth which is turned away from the sun, and directly opposite, that it can come with-



FIG 1

in the earth's shadow. Further, the moon must at that time be in the same plane as the earth's shadow; that is, the plane of the ecliptic in which the latter always moves. If the moon moved in the plane of the earth's path, there would be an eclipse every full moon, but as the moon's orbit makes an angle of more than 5° with the plane of the ecliptic, it frequently happens that though the moon is in opposition it does not come within the shadow of the earth. In the diagram (Fig. 1) it can readily be seen that to a person on the side of the earth away from the sun, the moon would be in total eclipse for some time. It may also be noticed that to a person on the moon the sun would be in partial eclipse.

An *eclipse of the sun* is the hiding of the whole or part of the sun by the moon as it passes between the earth and the sun; thus, all the eclipses of the sun happen at the time of the new moon. If the moon hides the whole

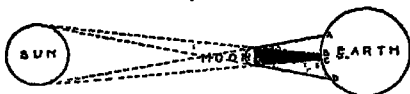


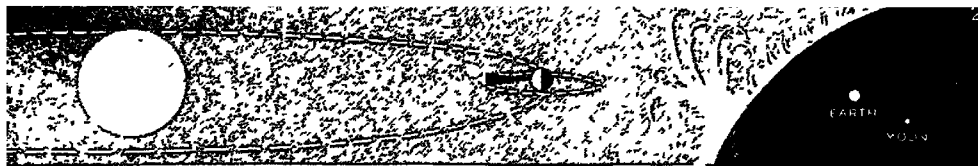
FIG 2

face of the sun, the eclipse is *total*; if it hides but a portion of the face, the eclipse is *partial*; if all but a narrow ring is hidden, the eclipse is *annular*. The accompanying diagram (Fig. 2) will explain how an eclipse of the sun is caused. To a person standing on the earth between B and C the eclipse will be total; to one between A and B or between C and D the eclipse will be partial.

An eclipse of the sun begins on the western side of its disk and ends on the eastern; and an eclipse of the moon begins on the eastern side of its disk and ends on the western. The average number of eclipses in a year is four, two of the sun and two of the moon; and as the sun and moon are as long below the horizon of any particular place as they are above it, the average number of visible eclipses in a year is two, one of the sun and one of the moon. Astronomers predict eclipses with absolute accuracy, and every year they announce where eclipses will be visible. In the United States total eclipses of the sun were visible in 1806, 1834, 1860, 1869, 1878, 1880, 1889, 1900, 1918, 1923, 1925 and 1932. The next will occur in 1945.

ECLIPTIC, *e kleept'ik*, the sun's path, or the great circle in which the sun *appears* to describe its annual course from west to east. The ecliptic actually corresponds to the path which the earth describes. The Greeks observed that the eclipses of the sun and moon took place near this circle, whence they called it the *ecliptic*. The ecliptic has been divided into twelve equal parts, each of which contains 30° (see *ZODIAC*). The position of the planets and the latitude and longitude of the stars are reckoned by the plane of the ecliptic. The points at which the equator and ecliptic intersect are subject to a continual variation, receding westward at the rate of about fifty seconds a year. The angle at which the ecliptic stands to the equator is also variable, and has been diminishing for about 4,000 years at the rate of about fifty seconds in a century. Laplace showed, however, that this variation has certain fixed limits, and that after a certain time the angle will begin to increase again. The combined result of these two changes is to cause the pole of the earth not to point constantly to the same spot in the heavens, but to describe an undulating circle round a certain point. This movement, however, is so slow that it takes many thousand years to complete it.

ÉCOLE DES BEAUX ARTS, *a koh'la bo sah'*, meaning "School of Fine Arts," is the name of an art school in Paris supported by the French government. It was founded in 1648 by Mazarin and is to-day the most important institution of its kind in the world. Courses are offered in drawing, painting, sculpture, architecture, en-



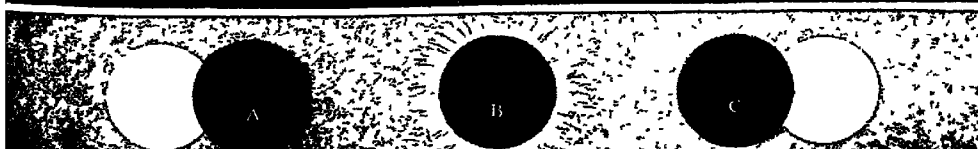
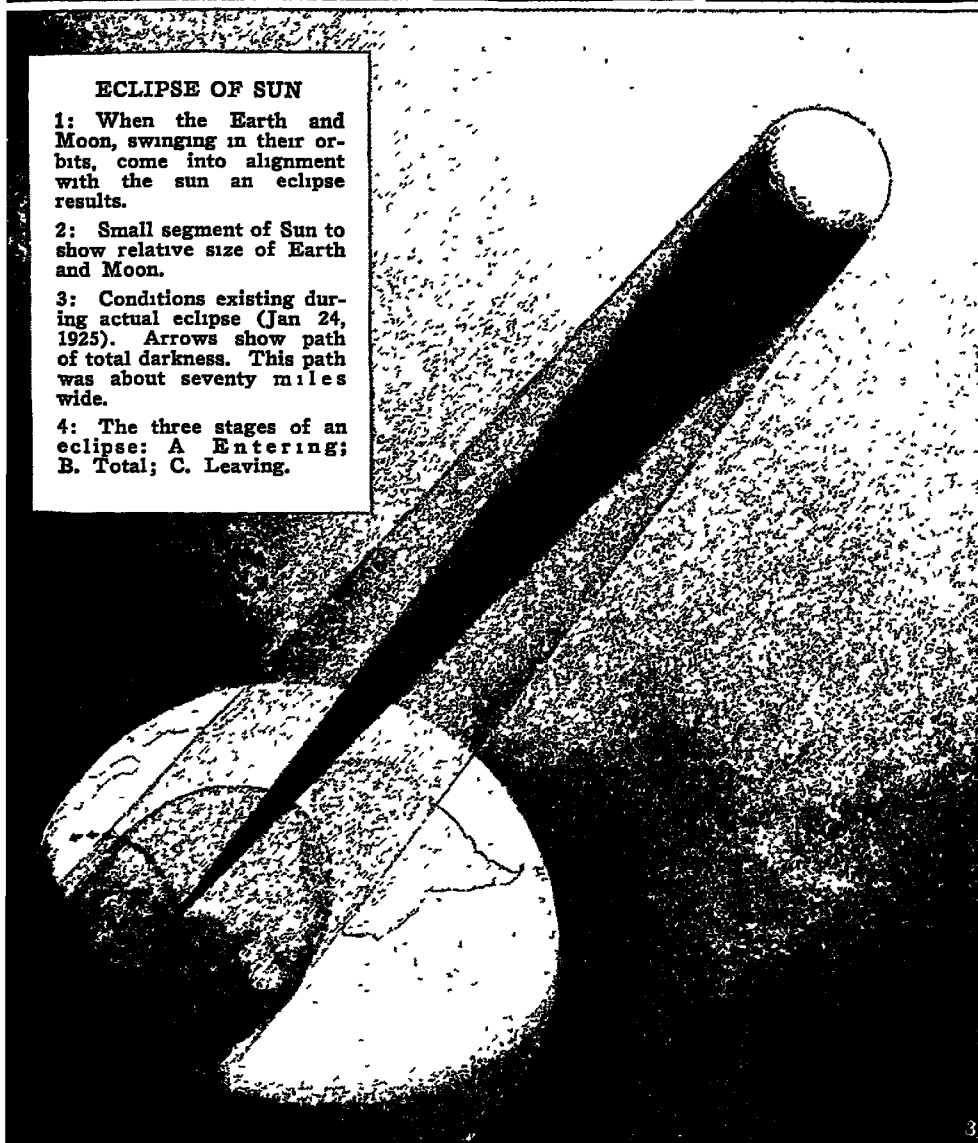
ECLIPSE OF SUN

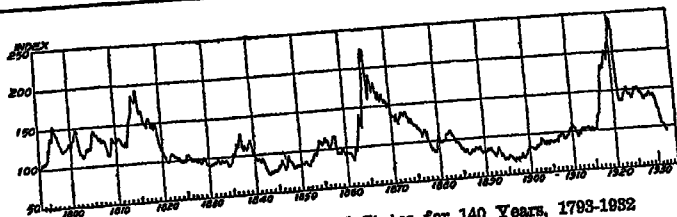
1: When the Earth and Moon, swinging in their orbits, come into alignment with the sun an eclipse results.

2: Small segment of Sun to show relative size of Earth and Moon.

3: Conditions existing during actual eclipse (Jan 24, 1925). Arrows show path of total darkness. This path was about seventy miles wide.

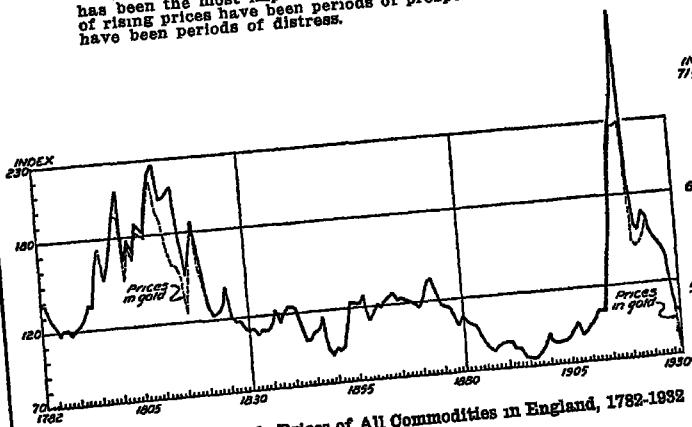
4: The three stages of an eclipse: A. Entering; B. Total; C. Leaving.





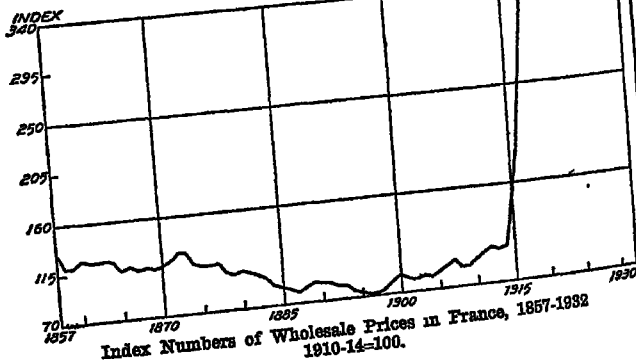
Wholesale Prices in the United States for 140 Years, 1793-1932
1910-14=100.

During most of the last 140 years, instability of the general price level has been the most important problem of agriculture and industry. Periods of rising prices have been periods of prosperity, and periods of falling prices have been periods of distress.



Index Numbers of Wholesale Prices of All Commodities in England, 1792-1932
1910-14=100.

Note the extreme rise in prices during the Napoleonic and World War periods

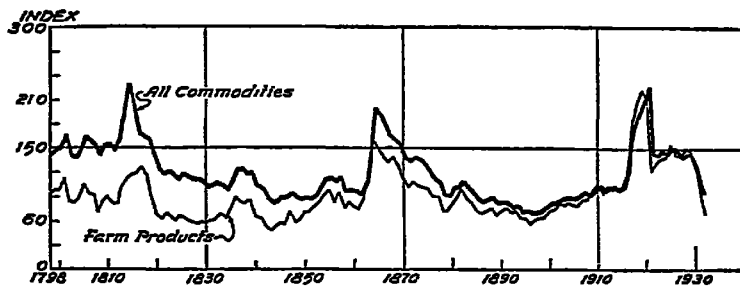


Index Numbers of Wholesale Prices in France, 1857-1932
1910-14=100.

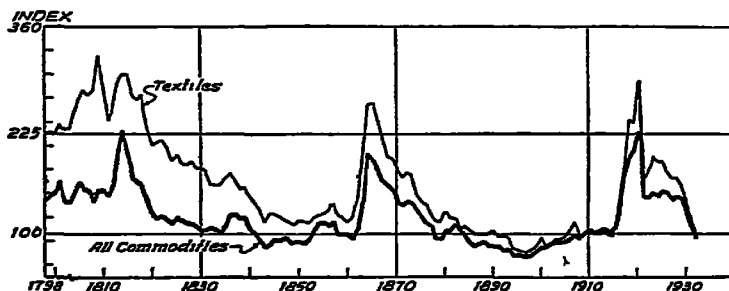
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WHOLESALE PRICES

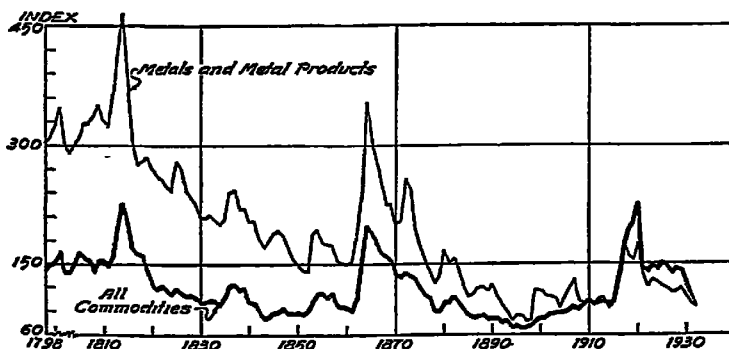
Economics
Chart, No 1



Index numbers of wholesale prices of farm products and all commodities, in U.S.A., 1798-1932 1910-14=100



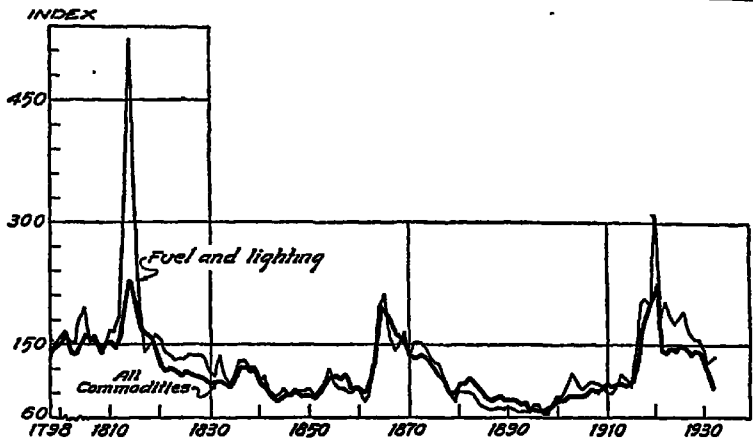
Index numbers of wholesale prices of textile products and all commodities, in U.S.A., 1798-1932. 1910-14=100



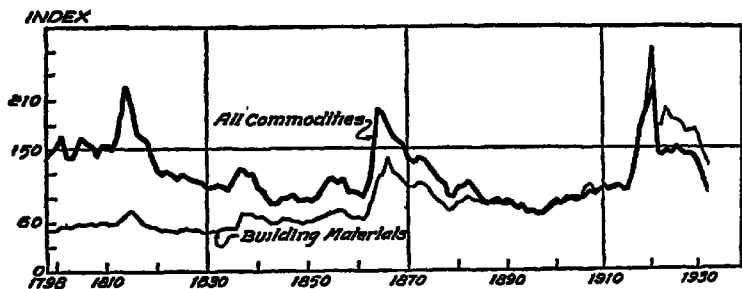
Index numbers of wholesale prices of metals and metal products and all commodities, in U.S.A., 1798-1932 1910-14=100

During the past Century, metals have declined in price compared with all commodities

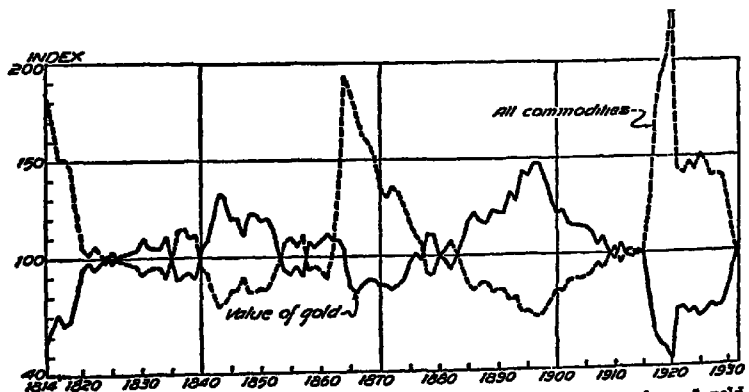
WHOLESALE PRICES



Index numbers of wholesale prices of fuel and lighting and all commodities, in U.S.A., 1798-1932. 1910-14=100

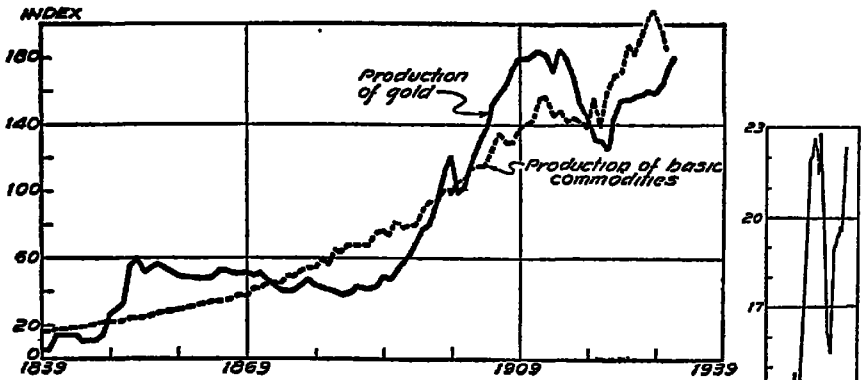


Index numbers of wholesale prices of building materials and all commodities, in U.S.A., 1798-1932. 1910-14=100



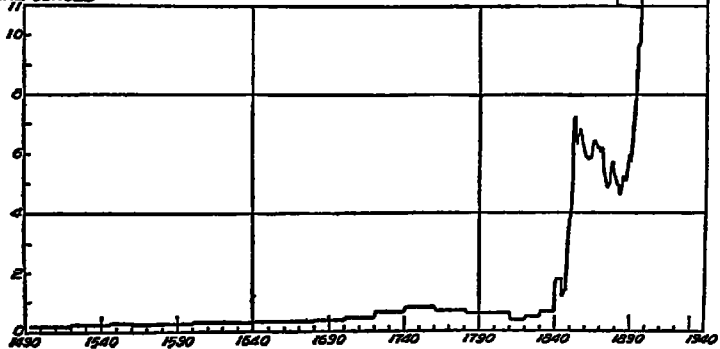
Index numbers of wholesale prices of all commodities and the value of gold, in U.S.A., 1814-1932. 1910-14=100

WHOLESALE PRICES



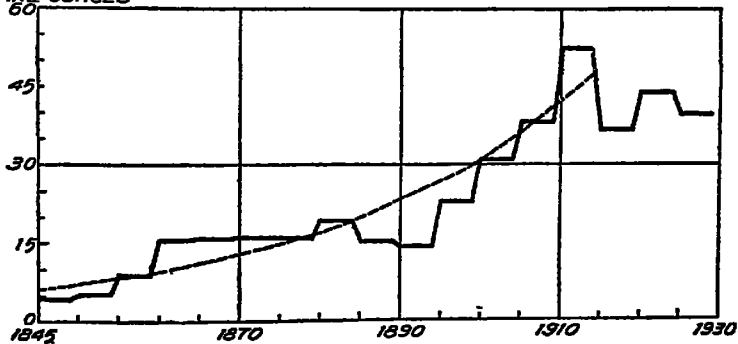
Index numbers of the world's physical volume of basic production and world gold production, 1839-1932. 1880-1914=100

GOLD PRODUCTION
MILLIONS OF FINE OUNCES



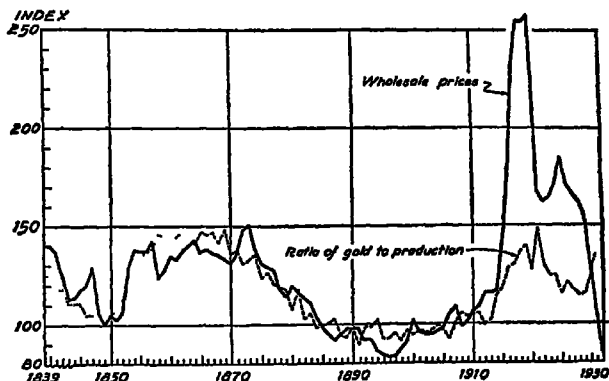
World production of gold, 1830-1932

MILLIONS OF FINE OUNCES



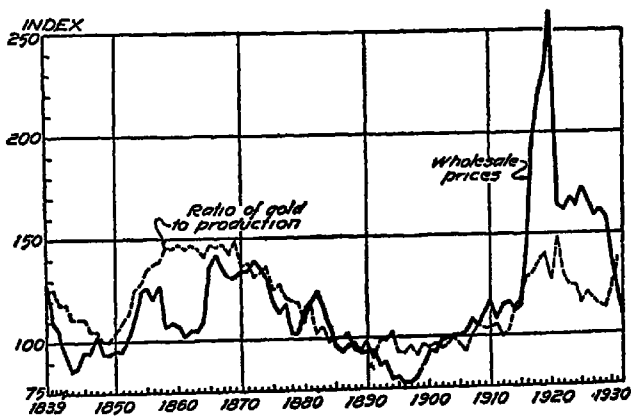
Gold used in industry in the world, 1845-1929

GOLD



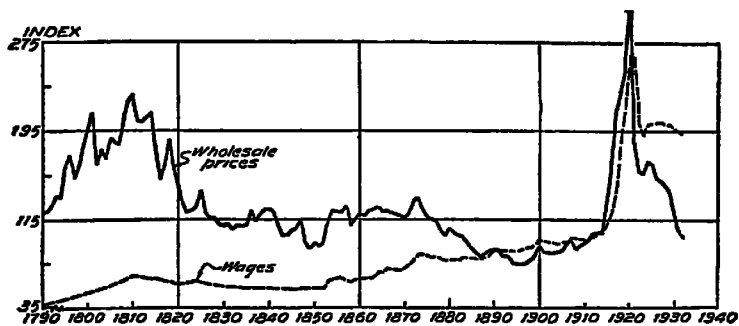
Ratio of world's monetary gold stocks to world physical volume of production compared with wholesale prices in England, 1839-1932. 1880-1914=100

For 75 years before the World War, world monetary stocks of gold had to increase at the same rate as the world physical volume of production in order to maintain stable commodity prices in England. If gold stocks increased more rapidly than other things, prices rose, if they increased less rapidly, prices fell.

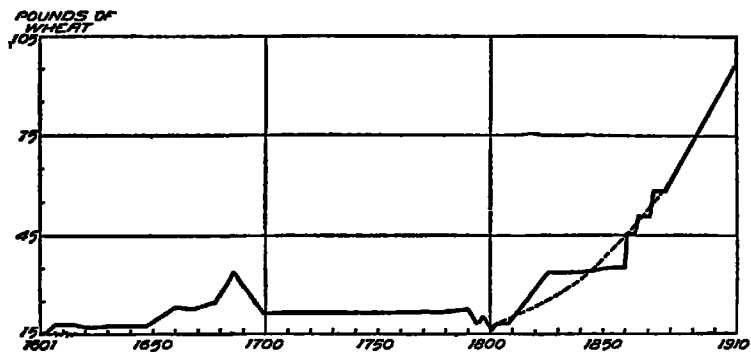


Ratio of world's monetary gold stocks to world physical volume of production compared with wholesale prices in the United States, 1839-1932. 1880-1914=100

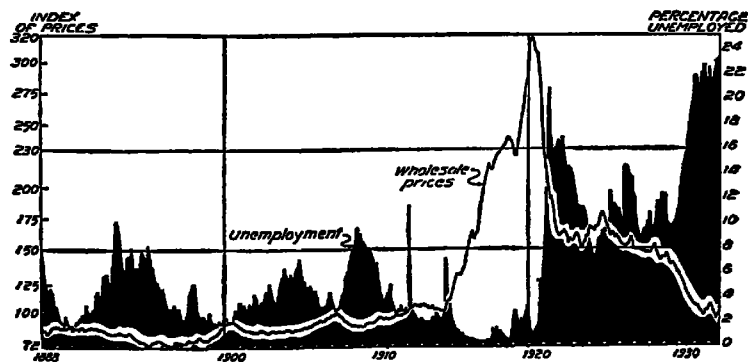
Except for the Civil War and the World War periods, when the world's monetary stocks of gold increased faster than the production of other things, prices rose. Conversely, when the monetary stocks increased less rapidly than the production of other things, prices fell.



Wholesale prices and wages in England, 1790-1932. 1910-14=100

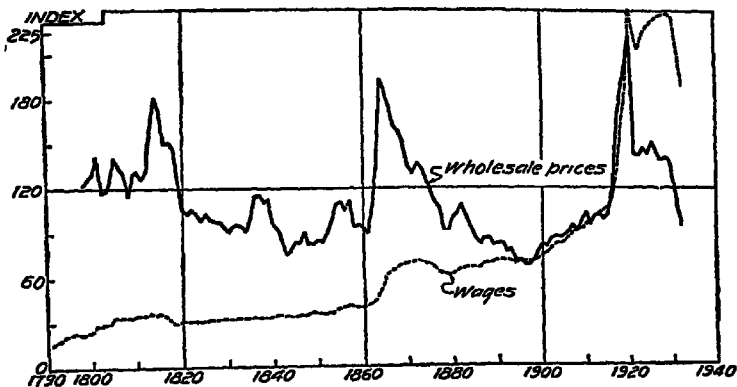


Amount of wheat that a day's labor would buy in London, England, 1601-1910

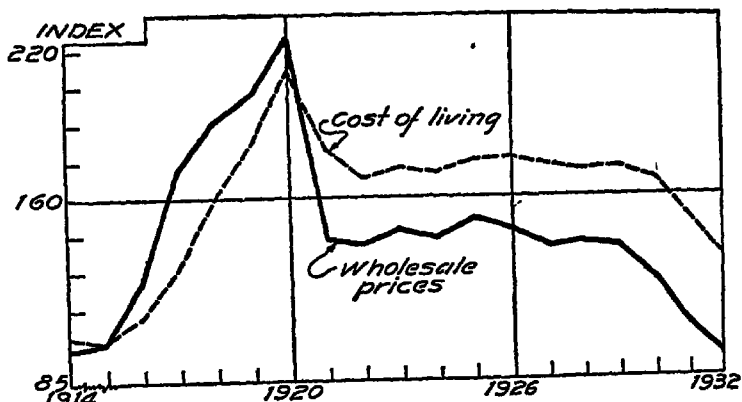


Wholesale prices and percentage of unemployed among trade unions and insured work people in Great Britain, 1888-1932

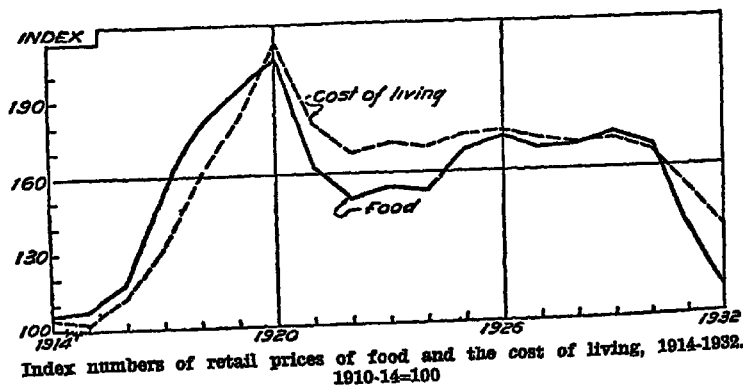
When prices are rising, unemployment declines. Conversely, falling prices result in an increase in the percentage of unemployed



Wage rates and wholesale prices in the United States, 1790-1932



Wholesale prices of all commodities and the cost of living, 1914-1932.
1910-14=100



Index numbers of retail prices of food and the cost of living, 1914-1932.
1910-14=100

WAGES, PRICES, COST OF LIVING

graving and allied branches. The school of architecture is one of the most important departments. In 1666 the *prix de Rome* was instituted, and competitive examinations for this prize take place at the Ecole. The successful competitors receive an annual allowance from the government for three or four years, two of which must be passed at Rome. The competition is open to all artists between the ages of fifteen and twenty-five, whether they are pupils of the school or not. The school provides for about 1,300 students. There has always been a large attendance of Americans

ECOLOGY, *e ko'lo ji*, a name given to that department of botany which treats of plants in their relations to their surroundings, and which deals with such subjects as the distribution of seed, cross fertilization and the grouping of plants according to soil and climatic conditions. See **CROSS FERTILIZATION**; **SEED DISPERSAL**.

ECONOMICS, *e ko nom'iks*, the science which treats of the production, distribution and consumption of those things which man deems necessary for his comfort or happiness; that is, the things in general use. The term *economics* is replacing an older term, *political economy*, but the two are identical in meaning. Economics is a subject in which everyone has a vital interest. A man may go through life entirely ignorant of calculus, he may have only a superficial knowledge of botany or zoology, and he may be unable to pass a simple test in astronomy, but every day of his life he is directly applying some law of economics. The whole structure of modern civilization is built upon its laws. The paying of rent, the drawing of wages, the purchase of household commodities, the manufacture and wearing of clothing, the investment of capital and the starting of a savings account are all different phases of the science of economics.

A study of economics shows us that the human race is essentially one great family. In any community, no person can live unto himself. Even the hermit must come into contact with the world to the extent of obtaining his daily necessities, unless, indeed, he should live in the woods like a savage. Each community, in turn, is dependent upon other communities. If the coal miners in a certain section go on a strike, all the homes and industrial plants supplied

by the mines in question are affected, and if the strike is protracted factories may have to close for lack of fuel. In a larger sense, nations are dependent upon one another for the necessities of life, a fact brought out in any great war and emphasized now in the League of Nations.

It follows, then, that free trade and tariff questions are important factors in world economics, for they have to do with the economic relations of one country to another. It has been argued by one group of economists, and controverted by another, that if universal free trade prevailed the chief cause of war would be removed, as all the nations would be brought into closer relations and the animosities aroused by protective tariffs would be done away with. Ethical and moral questions, as indicated above, enter largely into the study of economics. The relations of capital to labor, the question of the unequal distribution of wealth, the problems of competition, these and countless other subjects are being discussed from the standpoint of justice and the common good. While economics deals with practical things—the things that man eats and wears and enjoys—it is more and more being studied from an idealistic standpoint. It is in this respect that labor questions are now being examined.

Related Articles. Consult the following titles for additional information

GENERAL

Annuity	Leisures Faire
Bimetallism	Lockout
Blacklist	Minimum Wage
Bounty	Money
Boycott	Mothers' Pensions
Budget	National Debt
Capital	Old Age Pensions
Child Labor	Open Shop
Communism	Pauperism
Conservation	Pension
Consumption	Peonage
Coöperation	Population
Corn Laws	Profit Sharing
Corporation	Protection
Credit	Reciprocity
Customs Duties	Rent
Debt	Single Tax
Embargo	Socialism
Employer's Liability	Strike
Factory and Factory	Supply and Demand
Legislation	Sweatshop System
Famine	Syndicalism
Free Trade	Tariff
Grasham's Law	Tax
Income Tax	Tenement
Inheritance Tax	Trusts
Interest	Usury
Labor, Division of	Value
Labor Legislation	Wages
Labor Organizations	Wealth

ECONOMISTS

Ely, Richard T.	Proudhon, Pierre J.
George, Henry	Smith, Adam
Hadley, Arthur T.	Walker, Francis A.
Laughlin, James L.	Wright Carroll D.



Park entrance,
Guayaquil

ECUADOR, *eh'wah dawr*, next to the smallest republic of South America, exceeding only Uruguay in size. In shape it is triangular, with the base on the Pacific Ocean; it extends to a point about 500 miles eastward, but the actual boundary is in dispute. Peru claims a considerable portion of Ecuador and a little of Colombia, while Ecuador claims not only all of its present area but a triangular section of Northeastern Peru (see map). The estimated area is 275,936 square miles, and the country is therefore slightly larger than Texas. The population in 1933 was estimated at 2,600,000. Quito, the capital (107,000 people), is the most elevated seat of government in the world, and is only a few miles south of the equator.

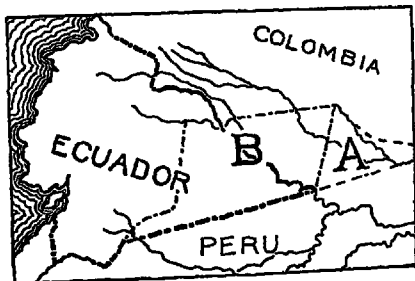
The People. Nearly three-fourths of the population are Indians and mixed descendants of the Incas (which see); about 400,000 of these are of mixed blood. There are only a few thousand people of pure European stock. The Indian population is fairly industrious and orderly, a heritage from generations of well-behaved ancestors, but their condition is almost one of bondage. Spanish is the official language (see **DEMARCATON, LINE OF**), but the Indians use a number of dialects. The religion is Roman Catholic. Education is in a backward state; there are only about 175,000 children in schools. There is a university in Quito, and in the whole country there are a few secondary schools.

Surface and Drainage. The surface of Ecuador is divided into three regions: the lowland region along the coast; the highlands, including the mountains and plateaus in the central portion of the country, and the extensive plains on the east. The coast region is comparatively narrow, and from this the highlands rise abruptly to the plateau, upon which two parallel ranges of the Andes rest, extending north and south. Among the groups of mountains of this region are sixteen peaks having altitudes ranging from 15,000 to 20,500 feet. The most noted of these are Chimborazo, 20,498 feet, and Cotopaxi, 19,600 feet, as far as known the highest active volcano in the world. Near

the northern boundary these parallel ranges converge and form several elevated tracts, known as *knots*, the most prominent one being in the southern part of Colombia. Toward the south there is a similar convergence, and between these points are a number of plateau valleys, the most important being those of Quito, Hambato and Cuenca. In elevation these range from 8,000 to 14,000 feet. Their soil is fertile, and they are the home of the greater part of the population of the country. East of the Andes the land slopes to the great plain, which is continuous with the basin of the Amazon.

Most of the rivers are rapid mountain streams and are of little value for navigation. However, the Amazon, known in this part of its course as the Marañon, is navigable to the point nearest to the southern boundary, and some of the larger tributaries can be ascended a part of the way with small boats.

Climate. Being directly under the equator, Ecuador has a tropical climate, but ow-



THE BOUNDARY DISPUTE
A Ecuador's claim, B. Peru's claim

ing to the varying elevations, this is greatly modified, so that actually within the country all grades of climate, from the tropical to the frigid, are found. The lowlands on the coast are exceedingly hot, moist and in many localities unhealthy; and the plains on the east are hot and comparatively dry, while the plateau valleys have a temperate and salubrious climate, in which spring reigns throughout the year. Above these, the highest altitude of the mountains have a rigorous, cold climate, and most of the summits are crowned with perpetual snow. The rainfall is ample for agricultural purposes, and throughout the country there are two seasons, known as the wet and the dry, though in the plateau valleys these are not distinctly marked.

Mineral Resources. Ecuador has rich deposits of minerals, consisting of gold-bearing quartz, silver ore, deposits of copper, iron, mercury and petroleum. Emeralds and other precious stones have also been found within the country. However, owing to lack of transportation facilities and the indisposition of the people to engage in mining none of these has been worked on an extensive scale. British companies are working the oil fields.

Industries. Agriculture is the leading industry and is carried on chiefly in the plateau valleys. Wheat and barley sufficient for home needs are raised, and in some districts corn is successfully cultivated. Cattle are raised on the plains, and on the west side of the mountains there are many large tracts devoted to the cultivation of the cacao tree. Coffee is also raised upon the lowlands. Cacao is the country's staple product, cinchona bark, sarsaparilla, india rubber, hides and sugar are other agricultural and forest exports. Manufactures are few, and are confined almost entirely to domestic industries, except the manufacture of Panama hats, the world's center of this industry. This work is done almost entirely by the Indians.

Ecuador has always lacked good roads, but considerable improvement has been noted since 1930 in land transportation. Until that year there was only one motor road in the country, from the Colombia border to Guayaquil, 375 miles. In 1935 the length of motor roads was 1,600 miles, with an added 1,200 miles of branch roads. Guayaquil is the one large seaport, but there are eight other minor ports. Ecuador has 700 miles of railroad, the rail journey from the seacoast at Guayaquil up the mountains nearly 10,000 feet to Quito requires two days; the direct line is 165 miles, the rail line, much longer. In most of the country hauling is by pack animals. Rivers afford transportation during the rainy season.

Government. The government is republican in form. The chief executive is a President, who is elected by direct vote for four years. The legislative power is vested in a Senate of thirty-two members, and a Chamber of Deputies of fifty-six members. The senators are apportioned two to each province and are elected by direct vote for a term of four years, while the members

of the lower house are elected for a term of two years. The local government of each province is administered by a governor and a council.

History. Ecuador was a part of the empire of the Incas, and the country still contains remains of roads and other public works constructed by these people before they were conquered by the Spaniards. For some time after the conquest it was under the government of the viceroy of Peru. In 1822, along with other Spanish colonies, Ecuador gained its independence and became a part of the Republic of New Granada, now Colombia. This union was dissolved in 1829, since which date Ecuador has been an independent state.

Ecuador is no exception to the lack of tranquility in government in South American countries. Since the founding of the republic the Constitution has been rewritten twelve times. Most of the Presidents have served their full terms, but frequently under trying circumstances. A boundary dispute with Colombia was settled amicably in 1917, but the one between Ecuador and Peru remains a source of unrest, several offers of arbitration have been made.

Related Articles. Consult the following titles for additional information

Andes	Cotopaxi	Guayaquil
Chimborazo	Galapagos	Quito

ECZEMA, *ek'se ma*, a common skin disease, characterized by severe itching and the formation of crusts and scales. It may be caused by constipation, gout, indigestion or a disordered nervous system, and in many cases it is cured by a change of habits. Those afflicted should be cautious about using advertised remedies, salves, ointments, etc. The safest mode of procedure is to consult a reliable physician and follow his directions.

Babies are prone to three forms of eczema. Thin, undernourished infants sometimes have a dry, scaly eczema, principally upon the chest. Proper attention to the child's diet is the remedy in this case. Eczema of the face and head in fat babies is generally caused by too much fat in the food; the remedy is a change of diet, with increase of starch and sugar and decrease of fat. The third kind of baby eczema is called *tetter*, or *milk eczema*. The child's cheeks appear red and chapped, and there may be scaly patches on the head. Such a child should be examined and have a diet prescribed for him.

EDDA, the name given to two ancient writings in Scandinavian literature, known respectively as the *Elder*, or *Poetical Edda*, and the *Younger*, or *Prose Edda*. The first of these was compiled probably some time between the tenth and the thirteenth century. It consists of a collection of thirty-three songs which treat of the Scandinavian gods and heroes. The *Younger Edda* presents a kind of synopsis of the Northern mythology, and contains a treatise on the poetry and versification of the skalds, or ancient poets. It was first published in the seventeenth century, but it is supposed to have been written in the thirteenth.

EDDY, CLARENCE (1851-), an American organist and composer, born at Greenfield, Mass., and educated in America and in Germany. He was for twenty years a church organist in Chicago, and in the course of that time, and later, gained and maintained celebrity through his performances at international expositions and recitals in the great world centers of music. He has been called the greatest organist in America. Abroad he has received full recognition of his genius as an artist and as a composer.

EDDY, MARY BAKER (1821-1910), the discoverer and founder of Christian Science, born at Bow, N. H., July 16, 1821. She received her early education from her brother, Albert Baker, and at a private school in Tilton, N. H. Always thoughtful and religious, she early united with the Congregational Church, of which she remained a member until after her discovery of Christian Science. Of this discovery, which came to pass when she was living in Lynn, Mass., she wrote: "During twenty years prior to my discovery I had been trying to trace all physical effects to a mental cause; and in the latter part of 1866 I gained the scientific certainty that all causation is Mind and every effect a mental phenomenon." She then laid plans to spread her doctrines.

In 1875 Mrs. Eddy published *Science and Health with Key to the Scriptures*, the Christian Science text-book, which has been through many editions and has been translated into many foreign languages. Among her works written later are *Miscellaneous Writings*, *Unity of Good*, *The Church Manual*, *Retrospection and Introspection*, *Rudimentary Divine Science*, and *Pulpit and Press*. In 1879 she organized the Church of Christ, Scientist, which in 1892 was reorganized as

the First Church of Christ, Scientist, in Boston, Mass.

When a young woman, Mrs. Eddy was married to George Washington Glover and removed with him to Charleston, South Carolina, where he died. In 1877 she married Dr. Asa G. Eddy, who was associated with her in the work of Christian Science.

For a number of years, Mrs. Eddy lived in comparative retirement at Concord, N. H. In 1908 she went to Chestnut Hill, a suburb of Boston, where she remained until her death in 1910. See CHRISTIAN SCIENCE.

EDEN, in Biblical literature, the country where man first resided, specifically, the home of Adam and Eve. Much has been written upon the probable locality of Eden, but writers fail to agree in establishing its boundaries, though nearly all concur in locating it somewhere near the head of the Persian Gulf, probably in the valley of the Euphrates.

EDEN, [ROBERT] ANTHONY (1897-), one of the youngest men in the history of the British Empire to occupy the post of Secretary of State for Foreign Affairs. He was educated at Oxford University, then was plunged into the World War for four years, emerging as captain, before he was twenty-one years old. At the age of twenty-six he was elected to Parliament; later he gained valuable political experience as parliamentary private secretary in Cabinet circles, and in 1933 was promoted to Under-Secretary of Foreign Affairs. In June, 1935, he was made Special Minister for League of Nations Affairs; his rare qualities as a statesman were tested by his handling of British interests before the League during the debates on the Italo-Ethiopian war in Africa. Six months later he became Foreign Minister.

EDENTATA, *e den ta'tah*, a group of animals that have no front cutting teeth and therefore feed on insects and decaying animal matter. The pangolins and ant-eaters have no teeth at all; the armadillo, sloth, and aard-vark have rudimentary teeth in the back of the jaws. The edentata rank as the lowest of mammals, because the brain is small and undeveloped. The animals are slow in their movements, owing to the peculiar structure of their legs, which terminate in hooflike claws. The bodies are covered with coarse hair, which in the case of the pangolin forms a protective armor. Some of the edentata are found in Africa and Southern Asia, but

the largest numbers and species inhabit South America.

Related Articles. Consult the following titles for additional information:
Aard-vark Armadillo
Ant-eater Sloth

EDGAR ATHELING, (about 1057—about 1120), grandson of Edmund Ironside. After the Battle of Hastings, Edgar was named king of England by the Saxons, but William the Conqueror retained the power. Having been engaged in some conspiracy against the king, Edgar was forced to seek refuge in Scotland, but he became reconciled to William and was assigned a pension. Afterward, with the sanction of William Rufus, he undertook an expedition to Scotland for the purpose of displacing the usurper of the Scottish throne in favor of his nephew Edgar.

EDICT OF NANTES. See **N A N T E S**, **EDICT OF**.

EDINBURGH, *ed'n bur o*, **SCOTLAND**, capital of the country, a city of great historic interest. In Edinburgh Mary Queen of Scots and John Knox passed many eventful days, and it was at various times the home of Scott, Burns, Carlyle, De Quincey and Stevenson. The city is picturesquely situated on three elevations, and is surrounded on all sides by lofty hills, except on the north, where the ground slopes gently toward the Firth of Forth. It is divided into an Old Town and a New Town, and between these runs Prince's Street, one of the finest promenades in the world. Through the Old Town

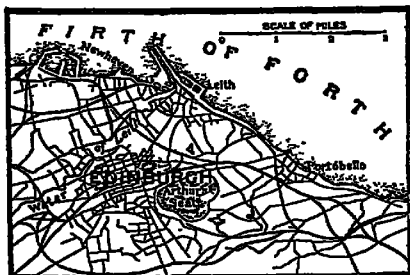
Supreme Court of Scotland; Saint Giles Church, or Cathedral, an imposing edifice in the later Gothic style, recently carefully restored; the Tron Church; Victoria Hall, with a fine spire, and the Bank of Scotland, besides some of the old family houses of the Scottish nobility. Sir Walter Scott's monument is in the New Town. In the Old Town the most remarkable public building is the Castle. In an apartment there are kept the ancient regalia of Scotland. About a mile northeast of the castle is the celebrated royal Palace of Holyrood, which had its origin in the abbey founded by David I in the twelfth century. No part of the present Palace is older than the time of James V (1528). In the northwest angle of the building are the apartments which were occupied by Queen Mary, nearly in the same state in which they were left by that unfortunate princess.

Among the various educational institutions are the University of Edinburgh, one of the most famous in Europe; the Advocates' Library, the largest library in Scotland, containing upward of 250,000 printed volumes and 2,000 manuscripts, and a fine public library erected by Andrew Carnegie. Besides the buildings already noted, Edinburgh possesses a large number of important edifices and institutions, chief among which are the Royal Institution, the National Gallery of Scotland, the Museum of Science and Art, the new Episcopal Cathedral of Saint Mary's and the Edinburgh Royal Infirmary, one of the best hospitals in Europe. This city is the headquarters of the book trade in Scotland and is the seat of the chief government departments.

Edinburgh is not an important manufacturing town; it has, however, various industries, including brewing, printing and publishing. The port is Leith.

In civic matters Edinburgh is very progressive. The city owns its street car, gas, street lighting and water supply systems, has built model tenements for its working people and has established public markets.

The origin of Edinburgh is uncertain. Its name is thought to be derived from Eadwinsburgh, the Burgh of Edwin, a powerful Northumbrian king, who absorbed the Lothians in his rule. The town was made a royal burgh in the time of David I; but it was not till the fifteenth century that it became the recognized capital of Scotland, un-



runs Canongate Street, rising gradually for almost a mile, and parallel with this is Cowgate Street. On the east, Calton Hill, 349 feet high, overlooks the city. Nearby are Salisbury Crags, and directly behind this a rocky hill, Arthur's Seat, 796 feet high.

Among the notable buildings are the ancient Parliament House, now the seat of the

der the Stuart kings. Population, 1921, 420,281; 1931, 438,998.

EDINBURGH, UNIVERSITY OF, a university established at Edinburgh, Scotland, in 1582, by a charter granted by James VI. The government is vested in a senate, the university court and a general council. The general council consists of the chancellor, members of the university court, the professors and all graduates of the university. Degrees are given in music, science, arts, divinity, law and medicine. The medical department has attained a world-wide reputation for its efficiency. In normal years the faculty numbers 200 and there are about 2,000 students enrolled. The library contains 220,000 volumes and many manuscripts. In addition to this, there is a theological library of about 10,000 volumes. Women are admitted to university privileges.

EDISON, THOMAS ALVA (1847-1931), the most notable inventor of modern times, aptly called the "wizard of electricity." He was born at Milan, Ohio, received a common school education, and when still a mere lad began work as a newsboy on the Grand Trunk Railway. He learned printing in spare moments and edited and printed the *Grand Trunk Herald* in the baggage car of the train on which he was employed. A course in telegraphy was given him in recognition of his having saved a child's life, and he became a very rapid and skilful operator. He was employed by the Western Union Telegraph Company and in this capacity began the series of inventions which brought him fame.

After brief sojourns in several western cities he settled in Boston. Carrying on his experiments there, he was able to overcome the difficulties connected with sending two messages in opposite directions at the same time over the same wire.

His laboratories were first located at Menlo Park, N. J., and later he established headquarters at Orange, N. J., where he afterward lived. He devoted himself mainly to electricity, but had marked success in other lines. He was granted at least 1,050 patents. Some of his most valuable inventions, patented in other countries as well as in America, are the phonograph, an instrument for making permanent records of articulate sounds; the microphone, which detects the faintest sound; the megaphone, by the aid of which ordinary sounds can be heard at a great dis-

tance; the microtasmeter, which records minute variations in temperature. His incandescent lamp combines purity, steadiness, safety and simplicity and is the most widely used of all of his inventions. The kinetoscope, which was one of his last inventions, is a machine for projecting motion pictures. One of his greatest inventions was the storage battery. It was put on the market in an imperfect state, as later developed; the inventor then spent five years in perfecting it. Although he never made a great scientific discovery, Edison performed an inestimable service to mankind in applying scientific knowledge to practical ends. His influence on the industries and commerce of America cannot be overestimated. He was a member of the National Academy of Sciences.

EDMONTON, ALBERTA, the capital of the province, 800 miles northwest of Winnipeg and 525 miles east of Vancouver. It is situated on two great railway systems, the Canadian Pacific and the Canadian National railroads, which have also numerous branch lines radiating from the city, and on the north branch of the Saskatchewan River. Edmonton is one of the most important cities of Western Canada. Of the towns in the prairie provinces only Calgary and Winnipeg were larger in 1931. In 1901 there were only 2,626 people in the city; in 1921 the number had increased to 58,821, and in 1931 to 79,197.

The industries of the city include meat-packing establishments, foundries, saw mills, flour mills, brickyards, grain elevators, cigar-making, motor-boat yards, as well as a great variety of lesser factories. There are many branch banks and large wholesale houses. Educational facilities are unexcelled; the University of Alberta is here, and the city also has Robertson College, Roman Catholic convents and a seminary. The churches number more than forty. The finest buildings are those of the provincial parliament and of the university.

Edmonton is the center of a vast timber region; there is natural gas in the vicinity, and strong indications of oil are not lacking. There are thirty coal mines in or near the city. The municipality owns the public utilities—electric light, waterworks, telephones and the street railways.

Edmonton was the site of a trading post as early as 1795; a few years later it became one of the outposts of the Hudson's Bay



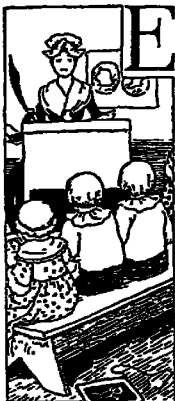
Keystone

"THE WIZARD OF MENLO PARK"

This illustration is from a portrait of Thomas Alva Edison taken two years before his death

Company In 1876 the first telegraph line reached the town; in 1891 the first railroad was built north from Calgary. In 1905 the city became the capital of the new province of Alberta.

EDOM (in the New Testament, *IDUMAEA*), in ancient times a country lying to the south of Palestine, between the Dead Sea and the Gulf of Akabah. The chief city in this region was Bozrah, the site of which is now remarkable for its ruins.



EDUCATION, *ed u ka'shun* Someone has said that *education* is the largest word in the vocabulary of life, because it symbolizes all the forces that have raised man from the plane of the brute. The derivation of the word confirms the above statement. It is from the Latin *educere*, which means to *lead forth*, and in its broadest sense it signifies the bringing out and developing of all the powers of the individual.

There are two sorts of education, that obtained from the schools and that obtained from the experiences of life. All men obtain the latter, but only those living in countries having systems of public schools are likely to obtain the former. Since a person with a well-trained mind can make a much wider application of his experiences than one who does not possess this training, it follows that of all the forces that work for man's education the school has the most direct and the most widespread influence. Were it not for the organized school systems of the various nations, the majority of the people in the world to-day would be unable to read or write. Generally speaking, a nation that is progressive and enlightened has a small percentage of illiteracy. It has been a backward, despotic country, like the Russia of centuries under the czars and recently under the terror of bolshevik outrage, and China under the emperors, which kept the great mass of the people ignorant and unenlightened.

The tendency everywhere is more and more toward the extension of popular education. In 1918, England, though in the throes of the World War, passed a new education

bill, making its national school system more democratic. The same year saw a bill discussed in the United States Congress providing for appropriations to the Bureau of Education (now Office of Education) whereby the Bureau could carry on intensive work to stamp out illiteracy.

The sponsors of movements such as these recognize the great handicap suffered by the individual with limited school advantages. In normal times a boy with an elementary school education can hope to obtain a position that will pay him two dollars a day. Those who have attended high school will work up to positions averaging \$100 a month. The college-trained man may be earning many times that amount, for his mental equipment is far superior. The practical value of an education, however, is not its only favorable aspect. A liberal education opens many new fields in general culture, and it gives the individual a greater capacity to enjoy the worth-while things of life.

As stated above, education in a broad sense is the development of all the powers of the individual. This fact is recognized in modern school systems in their provision for physical as well as intellectual training. In many towns and cities, doctors, dentists and nurses examine the pupils of the schools for physical defects, and those with bad teeth, adenoids, diseased tonsils, defective eyesight and hearing, Saint Vitus's dance and other ailments are placed under proper medical care. In the poorer districts of some large cities the children are given nourishing food free or at a nominal cost, and school lunch-rooms and cafeterias, which serve well-cooked and wholesome foods, are becoming common. Playgrounds and gymnasiums are also included in the equipment of the most up-to-date schools, and swimming pools are added to this equipment in many modern high schools.

Another modern tendency is the emphasis placed on the practical, and the inclusion in the curriculum of manual training, cooking, sewing and other "useful" subjects. Vocational schools and evening classes, open-air schools, schools for the deaf, dumb and blind, professional schools and schools for training teachers flourish, and emphasize the fact that modern education is not only broad but so specialized that there is a place for everyone in the road to knowledge.

For national systems of education, see articles on the various countries

Related Articles. Consult the following titles for additional information

GENERAL

Academy
Adolescence
Adult Education
Agricultural College
Agricultural Experiment Stations
Alma Mater
Blindness, subhead
Education of the Blind
Business College
Child Study
Child Training
Coeducation
College
Common Schools
Compulsory Education
Conservatory
Corporal Punishment
Correlation
Deaf and Dumb
Deductive Method
Degree
Education, Office of; Commissioner of Education Association, National
Elective Studies
Feeble-minded, Education of
Fellowship
Fraternities, College
Games and Plays
Gardening
Geography, Methods of Teaching
Gymnasium
High School
History, Methods of Teaching
Illiteracy
Indians, American, subhead Indian Education
Inductive Method
Industrial School
Kindergarten
Language, Methods of Teaching
Law Schools
Library
Lyceum
Medical Schools
Methods of Teaching
Military Schools
Montessori Method
Negro
Normal School
Number, Methods of Teaching
Open Air Schools
Parent-Teacher Associations
Peabody Education-
al Fund
Pedagogics
Rhodes Scholarships
School Gardens
Schools, Consolidated
Schools, Correspondence
Sloyd
Story Telling
Technical and Industrial Education
University
University Extension
Vocational Guidance

SUBJECTS TAUGHT IN SCHOOLS

Agriculture
Algebra
Anatomy
Archaeology
Arithmetic
Astronomy
Biography
Biology
Botany
Calculus
Chemistry
Civil Government
Drawing
Economics
Geography
Geology
Geometry
Grammar
History
Language and Grammar
Literature
Manual Training
Mathematics
Mineralogy
Mythology
Nature Study
Orthography
Philology
Philosophy
Phonetics
Physical Culture
Physics
Physiology
Psychology
Reading
Rhetoric
Sanitary Science
Shorthand
Sociology
Spelling
Trigonometry
Writing
Zoology

EDUCATIONAL INSTITUTIONS

All state and provincial universities are listed under their appropriate headings

For other educational institutions consult the following titles:

Amherst College
Armour Institute of Technology
Barnard College
Berlin, University of
Boston University
Bowdoin College
Bryn Mawr College
Cambridge, University of
Carnegie Foundation
Carnegie Institution
Catholic University of America
Chautauqua Institution
Chicago, University of
Cincinnati, University of
Clark University
Columbia University
Cornell University
Dartmouth College
Denver, University of
De Pauw University
Drexel Institute
Edinburgh, University of
Eton College
Fisk University

George Washington University
Girard College
Hampton Normal and Agricultural Institute
Harvard University
Johns Hopkins University
Laval University
Leland Stanford Junior University
Lick Observatory
McGill College
and University
Massachusetts Institute of Technology
New York, College of the City of
New York University
Northwestern University
Notre Dame, University of
Oberlin College
Oxford University
Paris, University of
Pennsylvania, University of
Princeton University
Purdue University
Radcliffe College
Rugby School
Smith College
Syracuse University
Toronto, University of
Tufts College
Tulane, University of Louisiana
Tuskegee Normal and Industrial Institute
Valparaiso, University of
Vanderbilt University
Vassar College
Washington University
Wellesley College
Western Reserve University
William and Mary College
Williams College
Yale University
Yerkes Observatory

EDUCATORS

Angell, James Burrill
Armstrong, Samuel Chapman
Arnold, Thomas
Barnard, Frederick A P
Barnard, Henry
Brown, Elmer Ellsworth
Bryce, George
Butler, Nicholas Murray
Carman, Albert
Claxton, Philander P.
Comenius, John Amos
Dawson, John William, Sir
De Mille, James
Dewey, John
Draper, Andrew Sloan
Duncan, Norman
Elliot, Charles William
Fenelon, François de Salignac
Finley, John H
Froebel, Friedrich Wilhelm August
Garfield, Harry Augustus
Gilman, Daniel Coit
Hadley, Arthur Twining
Hall, G Stanley
Harper, William Rainey
Harris, William Torrey
Hibben, John G.
Hopkins, Mark
Hughes, James L
Hutchins, Robert M.
James, Edmund James
Jordan, David Starr
Judson, Harry Pratt
Low, Seth
Lowell, Abbott Lawrence
Lowell, James Russell
Mann, Horace
Mather, Increase
Montessori, Maria
Northrop, Cyrus
Norton, Charles Elliot
Parker, Francis Wayland
Pestalozzi, Johann Heinrich
Scherman, Jacob Gould
Sturm, John
Tyler, Moses Coit
Van Hise, Charles Richard
Vincent, George Edgar
Washington, Booker T
Wheeler, Benjamin Ide
White, Andrew Dickson
Willard, Emma Hart
Wilson, Woodrow
Young, Ella Flegg

EDUCATION, BUSINESS. See BUSINESS COLLEGE.

EDUCATION, OFFICE OF. The United States Office of Education was established in 1867 as a division of the Department of the Interior. Its function is to gather and distribute information on education, but its work is of an advisory nature, and its officials are careful not to interfere with the systems organized by the various states. Among the divisions of the Office are those on rural education, school sanitation and hygiene, home education and school administration. Circulars and bulletins, which may

be obtained on request, are published from time to time.

Commissioner of Education, the title of the officer at the head of the Office of Education. The office was established in 1867, and Henry Barnard (see BARNARD, HENRY), was appointed first Commissioner. The appointment is by the President with the consent of the Senate. The chief duty of the Commissioner is to collect educational statistics and give such information relative to the inspection, organization and management of public schools and methods of educating as will be of assistance in improving education throughout the country. The Commissioner publishes biennial reports, which embody his recommendations, and contain much valuable information concerning the educational systems and methods of teaching, not only in the United States but in other countries. He also presents an annual report to Congress.

EDUCATION, COMPULSORY. See COMPULSORY EDUCATION.

EDUCATION, NATIONAL SYSTEMS OF. See the subhead *Education*, in the articles on the various countries.

EDUCATION ASSOCIATION, NATIONAL, an association organized at Philadelphia in 1857 at the National Teachers' Association, incorporated in 1886 in the District of Columbia under its present title. For the first few years the National Education Association did not gain strength, but about 1870, through the division of the association into specialized departments and through the absorption of the American Normal Association and the National Superintendents' Association its effectiveness was greatly increased. There are now eighteen departments, besides an advisory board, known as the National Council, and the Department of Superintendents. The association holds annual meetings in different parts of the country, at which well-known educators lead in the discussion of all sorts of problems affecting the teacher's calling. The proceedings of the body are published as annual reports. Reports of committees upon special topics are also published under the auspices of the association. Membership in the association has grown from 50,000 in 1920 to more than 200,000. The annual sessions are growing in importance. A fine building for national headquarters has been erected in Washington.

EDWARD, surnamed *the Confessor* (about 1004-1066), king of England, son of Ethelred II. On the death of his half-brother, Hardicanute the Dane, in 1041, he was called to the throne and thus renewed the Saxon line. He cared little for political matters and spent most of his time in holy works. In 1161 he was canonized.

EDWARD, THE BLACK PRINCE (1330-1376), the eldest son of Edward III of England. In 1346 he commanded part of the forces at the Battle of Crecy and distinguished himself. In 1355 he commanded the army which invaded France from Gascony and won a victory in the great Battle of Poitiers. By the Peace of Bretigny, several provinces of France were formed into a sovereignty for the prince, under the title Principality of Aquitaine. When he recaptured Limoges from the French (1370), Edward put to death about 3,000 of the inhabitants. This is the greatest stain on his history. After his return to England he opposed many of his father's oppressive measures.

EDWARD I (1239-1307), king of England, son of Henry III, whom he succeeded in 1272. Before his accession to the throne he put down several revolts in Wales, which had been entrusted to his government. He also took part in a crusade with Louis IX of France, but accomplished nothing of importance. After his accession, he again turned his arms against Wales and succeeded in annexing that country to England. During the greater part of his reign he was engaged in a struggle for Scotland. When chosen judge to examine the rival claims of John Bahol and Robert Bruce he gained a hold on the country. When in 1306 Robert Bruce was crowned at Seone, Edward started north to subdue Bruce, but died on the way.

Edward was a great king and did much for England by establishing order and restricting the power of the clergy. For his influence on the laws of this country he is known as "the English Justinian." The most important event of his reign was the placing in the hands of a Parliament, in which the people of England were to be represented, all power to levy taxes.

EDWARD II (1284-1327), king of England, son of Edward I, on whose death, in 1307, he came to the throne. His weakness and incompetency soon became apparent, and the fact that he was constantly under

the dominion of foreign favorites led to numerous revolts. The war which his father had begun against the Scotch, Edward attempted to prosecute, but in 1314 he was completely defeated by Robert Bruce at Bannockburn, and some years later he was compelled to make a most unfavorable treaty with Scotland. He was at length deposed by a conspiracy of his great nobles and his wife, and in 1327 was murdered. His son succeeded him as Edward III.

EDWARD III (1312-1377), king of England, was made king on the murder of his father in 1327. The real power lay with the queen-mother Isabella and Mortimer, her lover, but three years after his coronation Edward banished Isabella from his court, had Mortimer put to death and took the power into his own hands. In 1333 he conducted an expedition against Scotland and won a victory at Halidon Hill, but in his other campaigns against Scotland he accomplished nothing of importance. French interference in favor of the Scotch gave Edward an excuse for invading France, of which he claimed, through his mother, to be the rightful sovereign. His victories there, even the capture and imprisonment of the French king, John, made England no richer; in fact, when Edward withdrew from the war that country was in an exhausted condition. The closing years of Edward's reign were disturbed by constant conflict with Parliament and by the opposition of his son, the Black Prince (see **EDWARD, THE BLACK PRINCE**).

EDWARD IV (about 1442-1483), king of England. His father, Richard, Duke of York, was the grandson of the fourth son of Edward III, while the rival line of Lancaster descended from John of Gaunt, the third son. Edward, on the defeat and death of his father at the Battle of Wakefield, became the head of the Yorkist party, and having entered London, after his splendid victory over the troops of Henry VI and Queen Margaret, was crowned with acclamation. His hold on the throne was not yet secure, however, and when the powerful Earl of Warwick, offended at Edward's marriage, went over to the Lancastrians, Edward was forced to leave the country. In 1471 he landed in England with an army, met Warwick and defeated him and was again proclaimed king. The remainder of his reign was peaceful.

EDWARD V (1470-1483), king of England, son of Edward IV. Upon his accession, at the age of thirteen, his unscrupulous uncle, Richard, Duke of Gloucester, proclaimed himself Protector of the Kingdom. He denied the legitimacy of the king and his brother and sent them to the Tower of London and afterwards had them murdered. The Duke is known in history as Richard III.

EDWARD VI (1537-1553), king of England, son of Henry VIII by his third wife, Jane Seymour. On his accession to the throne, upon the death of his father, his first care was to strengthen and advance the religious reforms instituted during his father's reign. Edward was himself too young to have much influence in affairs, and the chief power during his reign lay, first with his uncle, Edward Seymour, and later with the Earl of Warwick.

EDWARD VII (1841-1910), king of the United Kingdom of Great Britain and Ireland and emperor of India, the eldest son of Queen Victoria and Prince Albert, was born at Buckingham Palace, November 9, 1841. He inherited the title of Prince of Wales and was christened Albert Edward. He was educated at Christ's Church College, Oxford, and Cambridge University. In 1860 he visited Canada and the United States, where he received a most cordial welcome. Two years later, in company with Dean Stanley, the young prince made an extensive



EDWARD VII

journey through Egypt, Palestine and India. In 1863 he married Princess Alexandra, daughter of Christian IX of Denmark, by whom he had six children: Albert Victor, duke of Clarence, who died in 1892; George, duke of Cornwall and York, later George V; Lousa, duchess of Fife; Victoria, Maude and Alexander John, who died in 1871.

Although during the reign of Queen Victoria Edward had little or no part in state politics, he made frequent visits to the leading courts of Europe. He was a close student of world politics, and when he became king he astonished all but those intimately acquainted with him by his tact and



EDWARD VIII, KING-EMPEROR

The uniform is that of Colonel-in-Chief of the Welsh Guards

See biography, over

HIS MAJESTY, THE KING

EDWARD VIII, "by the Grace of God, of Great Britain, Ireland, and the British Dominions beyond the seas, King, Defender of the Faith, Emperor of India." The quotation embraces the title of the new ruler of the British Empire and Commonwealth of Nations. The regal power fell upon the shoulders of the comparatively young head of the royal House of Windsor, on January 20, 1936, upon the death of His Majesty, George V.

Edward VIII, the new king-emperor, was Edward Albert Christian George Andrew Patrick David, Prince of Wales. He was born on June 23, 1894, the eldest son of King George V and Queen Mary, and on his accession was approaching his forty-second birthday. At his birth, Queen Victoria occupied the throne of the Empire, and she was destined to rule until 1901, when the young prince was in his seventh year. Ahead of him in line of succession were his grandfather, then to become Edward VII, who ruled about nine years, until May, 1910, and his father, whose reign embraced a quarter century.

The future king received his early education from private tutors, and at the age of thirteen entered the junior school at Osborne, preparatory to a course at the royal naval college at Dartmouth. Leaving Dartmouth in 1911, he was invested with the Order of the Garter in June, and in July was created Prince of Wales and Earl of Chester. The investiture as Prince of Wales occurred in Wales, and it is worth recording that he was the first of the nineteen Princes of Wales to travel to that principality for this impressive and historic ceremony. After one year of service as midshipman in the navy, he entered Oxford (1912).

His university career terminated abruptly on the outbreak of the World War. The prince demanded permission to join the British army at the front. He was commissioned in the Grenadier Guards, but was commanded to remain in England. This caused bitter disappointment, so insistent was he that in November, 1914, he was sent to France as aid to Sir John French, then chief in command of the British forces. There he served eighteen months, then joined for three months the Mediterranean expeditionary force, followed by return to France. In 1917 he was on the Italian front for a few months, when again he joined the armies in France. Armistice Day found him serving with the Canadian troops. He could not be kept out of the danger zones, thus becoming the object of much anxiety to the high command.

After the war there were years of travel, in which the slim, fair-haired youth became truly the "ambassador of the Empire." He made long journeys to almost every part of the world where flies the British flag, and acquainted himself with the problems of far-away peoples joined together by the symbol of the Crown. In 1919 he visited Newfoundland and the Dominion of Canada, between 1920 and 1924 on similar tours he was welcomed in Australia, New Zealand, India, Burma, Ceylon, Hong Kong, and South Africa. On the occasions of his visits to Canada he crossed the international boundary and in the United States encountered a warmth of feeling quite beyond the respect due as a courtesy to the heir to a royal scepter.

The broad experience of Edward as Prince of Wales gave him an outlook shared by few men in his station in life. He declared that his part in the great war was insignificant, but that when he stole away to the trenches he mixed with men and found his manhood. His keenly observing mind in contact with the varied circumstances within his realm made him social-minded to a degree unapproached by any of his predecessors.

sagacity in diplomatic affairs. His reign was characterized by the negotiation of treaties which placed Great Britain in friendly relations with the leading nations of the world. The most notable were the alliances with Japan, France and Italy, and the friendly understanding with Russia. These treaties not only changed the position of Great Britain from that of isolation, in which she took pride during Victoria's reign, to that of friendly cooperation with other nations; but they also exerted a strong influence in maintaining for a long time the peace of the world.

EDWARD VIII, king of Great Britain and emperor of India, in succession to George V. See biography on back of portrait facing this page.

EDWARDS, JONATHAN (1703-1758), an American theologian and philosopher, was born at East Windsor, Conn. At seventeen he was graduated from Yale College and already had begun his serious metaphysical speculations. In 1727 he was ordained, and began preaching in Northampton, Mass. His pulpit eloquence won him fame throughout New England, but his uncompromising attitude with respect to certain Church doctrine led to his dismissal. He obtained an appointment as a missionary among the Indians, and in the quiet and seclusion it offered him he wrote his greatest book, *Freedom of the Will*.

EEL, a long, slimy, usually scaleless, or almost scaleless fish. Eels are sluggish during the day, but become active by night, sometimes crawling considerable distance on land through damp grass. They are good food-fish, though some people are prejudiced against them because of their snakelike appearance. There are a number of species, of which the commonest are the fresh-water eels, living on both sides of the Atlantic, in fresh-water streams for most of the year, but going to the sea to lay and hatch their eggs. See **ELECTRIC FISH**.

EGBERT, (?-839), considered the first king of all England, was of the royal family of Wessex. He became in 802 king of Wessex, and before 830 he had reduced the other kingdoms and rendered them dependent on him.

EGG. This term is usually thought of in connection with the eggs deposited by birds, from which the young are hatched, but zoölogists apply the term to the reproductive

cell from which all animals proceed, except those that are reproduced by cell division. In mammals, the class to which the human race belongs, the egg remains in the body of the female a long time, and the young are in most cases brought forth alive, but the larger proportion of egg-laying animals—worms, mollusks, insects, fishes, birds and reptiles—deposit the eggs before the young are hatched.

The eggs of birds are the most perfect and of the most general interest. The shell is composed almost wholly of carbonate of lime and has for its purpose the protection of the parts which it encloses. Just within the shell is a thin, tough membrane, which forms the lining. Next to the lining, and surrounding the yolk, is the white, which is composed almost wholly of albumen. The yolk is also inclosed in a thin membrane and is spherical. It is composed of a variety of substances, some of which contain margarine and oleane; its color is usually yellow. The germinal vesicle, or germ spot, is found within the yolk, and in the eggs of fowls it can be easily distinguished by its pearly-white appearance. It is from this that the young bird or chick is developed by incubation, the yolk and white serving for food during the process. In the large end of the egg there is a space between the lining and shell that is filled with air. As the egg grows old this increases in size. It is supposed by some that the air in this space is used by the chick while it is pecking out of the shell.

The germ is developed by heat, which is supplied by the female's sitting on the nest. The eggs of fowls and most birds require a temperature of 104° F. for successful incubation. The period of incubation varies with the species. The eggs of the white-eyed vireo require only seven days in which to hatch, while those of the common fowl require three weeks, and those of the turkey and most water fowl require four weeks.

The number of eggs laid by different birds also varies with the species. Some birds lay only one during the year, and others, as the hen, lay a large number. The robin usually lays four, the swallow from four to six and the crow four, six or seven. In many instances the color and shape of the egg are closely associated with the habits of nesting. Birds which lay their eggs on the ground without constructing any nest, lay an egg which is rounded at one end and nearly

comes to a point at the other. It blown by the wind these eggs roll round in a circle, while if they were oval, like those laid in deep nests, they could easily be blown away. (Compare in the color plate accompanying this article the eggs of the spotted sandpiper and the tern with those of the sparrowhawk and the crow.) Eggs laid on the ground, or in nests built on the ground, usually take the color of the pebbles or dead grass with which they are surrounded, while the bright colors belong to the eggs laid in well-constructed nests. Another peculiarity of the coloring is that the greatest variation is about the large end of the egg. (See in the color plate the eggs of the wood peewee, bobolink, purple grackle, meadowlark and other birds.)

The economic use of eggs is well known, and the eggs of the hen, the guinea fowl, turkey and domestic duck constitute an important item in the world's supply of food. In Labrador, the Orkney and Shetland islands and some other localities, the inhabitants collect the eggs of sea birds for food.

For suggestions on cooking eggs, see the article Domestic Science

EGGLESTON, EDWARD (1837-1902), an American novelist and historian, born at Vevay, Indiana. His education included an acquaintance with Latin and Greek and an extensive knowledge of the French language and literature, all gained largely through his own efforts. When nineteen years old he became a Methodist circuit rider and preached for ten years. His literary career began in 1866, as editor of the *Little Corporal*, at Evanston, Ill. In 1870 he became literary editor of the *Independent*, in New York City, and some time later he gave up that position to become editor of *Hearth and Home*. From 1874 to 1879 he preached in Brooklyn, and from the latter date he devoted himself to literary work. The purpose of his novels was to do "something toward describing life in the back country districts of the Western states," and the scenes of his most popular novels were laid in southern Indiana. Among his novels are *The Hoosier Schoolmaster*, *The End of the World*, *The Circuit Rider*, *Romy*, *The Hoosier School Boy* and *The Graysons*. He wrote a history of the United States, formerly widely used in schools.

EGGPLANT, a bushy vegetable belonging to the same family as the potato. Several

varieties are cultivated. In some the fruit has a whitish peel and is the size of a hen's egg; in others it is a deep purple on the outside and attains a diameter of from six to eight inches. The latter kind is a favorite vegetable on American tables.

EGLANTINE, *eg'lan'teen*, a wild rose sometimes called *sweetbriar*. Small dark-green leaves grow thick on its brown stems, and single pink blossoms with yellow centers give off a spicy odor. The thorns are stout and curving. The flowers shatter quickly, but the bright red or orange fruits which follow them—larger than most "rose" apples—last all winter and vie with bittersweet as interior decoration.

EGMONT, or **EGMOND**, **LAMORAL**, Count (1522-1568), a Flemish statesman and general, born in Hainaut. He succeeded to the family title and estates in 1541 and fought in the campaigns of Charles V in Algeria and against Francis I of France. He was rewarded with high honors and with responsible offices under the emperor. When Margaret of Parma became regent general of the Netherlands, Egmont joined William of Orange in opposing her Catholic policy. When rebellion finally broke out, however, Egmont for a time remained neutral and refused to follow the prince of Orange and other leaders into voluntary exile. Suddenly he was seized by royal officers, imprisoned at Ghent, condemned to death and executed with Count Hoorne in 1568 in the public square at Brussels. Egmont is the hero of one of Goethe's greatest tragedies.

EGOISM, a term derived from the Greek and Latin word *ego*, meaning *I*, and used in philosophy in two senses. In its earliest application, it meant the theory that nothing except one's own self can really be known. Modern and much more common usage applies it to any system in ethics which sets up the happiness of the individual himself as the justifiable end of his motives and acts. In this latter sense it is the opposite of *altruism* (which see). The two theories, however, overlap at many points, and cannot be classed as absolutely distinct ideas in philosophy.

EGRET, a *grei'* or *d'gret*, the name of a species of wood herons. The feathers on the rear part of the bird's back are long, reaching to the end of the tail, and even beyond at certain seasons. They are more beautiful than the feathers of the common heron. The



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21

BIRDS' EGGS

Birds of Prey

1. Sparrow Hawk
2. Screech Owl
3. Sharp-Shinned Hawk

Perchers

4. Wood Pewee
5. Meadow Lark
6. Yellow-Billed Cuckoo
7. Bobolink
8. Purple Grackle
9. Kingbird
10. American Crow
11. Humming Bird
12. House Wren

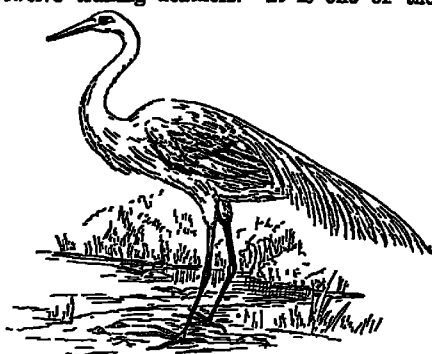
Chimbers

13. Red-Headed Woodpecker
14. Gambel's Partridge
15. Hen's Egg

Waders

16. Spotted Sandpiper
17. Green Heron
18. Semipalmated Sandpiper
19. Gull
20. Duck
21. Tern

American egret is about thirty-seven inches long, has soft plumage, a smooth head and twelve trailing feathers. It is one of the



EGRET

most beautiful of the native birds. The egrets have been so much hunted for their white flowing plumes, which women wear for ornament, that they are rapidly being exterminated. Laws now prohibit the wearing of egrets.



Colossal statue of Ramesses II

EGYPT, *Égypt*, a country of Northeastern Africa, a dreary desert waste in most parts, but wonderfully fertile in a narrow strip along both banks of the River Nile.

Egypt is called the "gift of the Nile," for without its yearly overflow, at which times it deposits rich alluvial soil on either hand, the country would all be as worthless as the Libyan and Arabian deserts, lying a short distance to the west and east of that providential stream. All of Egypt which is of real value to the world, therefore, is a narrow strip of fertile land in a vast rainless region. The fertile part contains only 13,600 square miles; the arid region covers an area of about 369,400 square miles. The entire area of the country, exclusive of the southern British portion, now known as the Anglo-Egyptian Sudan, is slightly more than 383,000 square miles.

Egypt is peculiarly fascinating to the historian of to-day, for this land was the cradle of a civilization so old that its beginnings reach far beyond the knowledge of man.

Who can estimate what long periods of human effort preceded the building of the Great Pyramid? Yet that massive structure has been standing for five thousand years, a perpetual challenge to the highest skill of modern engineers. Centuries before the erection of the pyramids Egypt was ruled by an orderly government, and its kings of that far-off period, so remote that its date can only be conjectured, were builders of great irrigation works, monuments and temples.

The People. The census of Egypt had never been taken accurately until 1927; in that year the population numbered 14,218,000 within the cultivated and settled area of 13,600 square miles, or about 1,045 people to the square mile. Nearly 11,000,000 were Egyptians of Arabian and negro blood, close to 2,000,000 were Turks and Europeans. The peasants are known as *fellahs*. Of the white people, Italians are most numerous; British residents are next in number, Frenchmen are third. Nearly all the native inhabitants profess the Mohammedan religion.

Surface and Drainage. Historically and geographically Egypt is divided into two parts; Lower Egypt, extending from the Mediterranean to Cairo, and including what is known as the Delta region; and Upper Egypt, extending from Cairo to the southern boundary. The Delta region is nearly triangular in shape. Its greatest extent from east to west is about 150 miles, and from north to south, 120 miles. This consists entirely of land made by the silt deposited from the river; it is low and level, contains many branches of the river, as well as numerous canals, and is very fertile. Within this region the greater part of the population of the country lives. The habitable portion of Upper Egypt consists of the valley of the Nile, which varies in width from fifteen miles, north of Cairo, to about two miles, farther up the stream. To the east of the Nile is a hilly and mountainous country, known as the Arabian Desert, but it should not be confounded with the desert of the same name in Asia. This region rises gradually by successive elevations until the highest altitudes are found on the borders of the Red Sea and attain about 7,000 feet, though the average altitude is much less than this. The surface is characterized by sand and barren rocks, and nearly all of the region is devoid of vegetation, except in a few places where there is sufficient moisture to afford

scanty support for the flocks of the Bedouins. To the west of the Nile is the great Libyan Desert, a sandy plain which is nearly level, but has in a few places depressed areas, whose surface is below the level of the sea. Most of these depressions are watered from subterranean sources or by canals leading to them from the Nile, and they constitute the oases of the desert; some of them are very fertile, and all are under the government of Egypt. See illustration with article PYRAMID.

Climate. Egypt is a land of clear skies and dry atmosphere. On the Mediterranean coast about 8 inches of rain falls during the year, while at Cairo the rainfall never exceeds 1½ inches, but at the extreme south there is a considerable rainfall. Less than one-fifth of the days are cloudy. Lower Egypt has a more even temperature than the desert region, removed from the influence of the sea. At Alexandria the temperature seldom reaches freezing point, but in the hot season, during the period of khamsin, it may reach as high as 110° or 115°. During the fall and winter the prevailing winds are from the north and northwest, while in the spring and summer they are from the south. April and May are characterized by the khamsin, which produces a high temperature and fills the air with sand (see KHAMISIN). The inhabitants divide the year into three seasons: the period extending from November to March; the summer, from March to June, and the period of overflow of the Nile, from July to November.

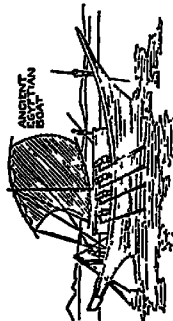
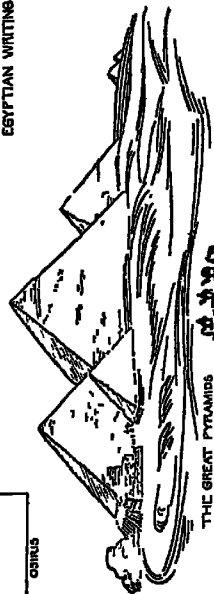
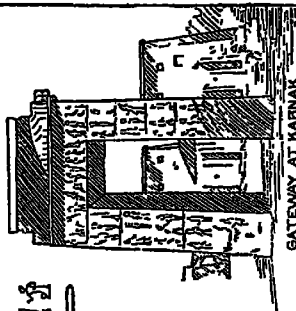
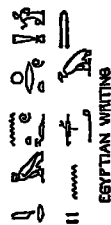
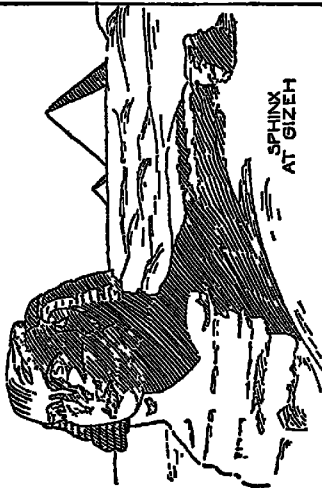
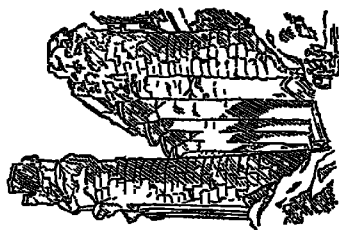
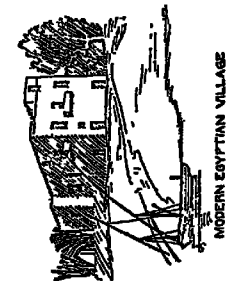
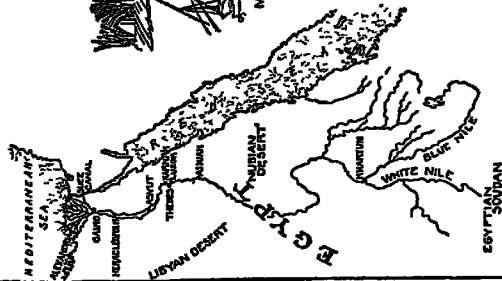
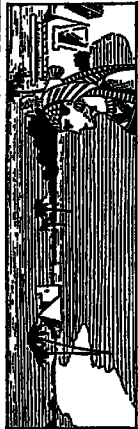
Mineral Resources. The most important minerals are building stone, consisting of granite, porphyry, limestone and sandstone. Of these the granite found near Syene, from which it was named syenite, has been known for the longest time. It was from these quarries that most of the rock for the great pyramids and for many of the ancient temples was obtained. The other stones are also valuable building stones. Phosphate rock is the largest single article of export. Because of the drifting sands, many deposits of minerals are undoubtedly covered. Petroleum has reached an output of about a quarter million tons a year. Engineers who have examined the country report that possibly gold mining can be made profitable along the beds of certain dry streams and in other localities.

Industries. Agriculture is the chief industry of the country and affords employ-

ment to more than two-thirds of the people who have a fixed occupation. The most important food plants are the date palm, wheat, rice, millet, vegetables and sugar cane. Besides these, various tropical and semi-tropical fruits are raised. Agriculture depends entirely upon irrigation and can be practiced only where water is obtainable. Because of this, the valley of the Nile is the only habitable portion of the country. The Delta region is provided with irrigation throughout the year, and here three crops can be grown. Of these, wheat and other cereals are raised between November and May; cotton and sugar cane mature between March and November, and maize and vegetables during a number of months of the year. The soil is exceedingly fertile, and notwithstanding the primitive methods of cultivation, excellent crops are obtained. Under English direction the rich soil yields nearly a bale of cotton on each acre, whereas in the United States nearly three acres are required to grow one bale. Since the construction of the barrage across the Nile at Cairo to raise the water in the river, a much larger area of the lower land is subject to irrigation, while the construction of the great dam at Assuan regulates the supply of water for the year. Most of the land is rented by those who work it.

Manufactures. There are few factories in the country. A number of sugar refineries are prospering, and a few cotton mills exist. Although Egypt is famous for the enormous quantities of cigarettes it manufactures, there is no tobacco grown in the country. There is much land suitable to the growth of a poor quality of the "weed," but its cultivation is prohibited, that there may be large revenue from its importation and to provide against the use of inferior tobacco in the factories. There is considerable textile manufacturing, largely of goods to be sold to tourists.

Transportation. The Nile is navigable for small steamers as far as the first cataract, which is just north of the southern boundary. The country contains 3,420 miles of railway, which is owned and operated by the government, and about 900 miles of so-called agricultural roads, operated by private corporations. These roads connect the agricultural regions with the main lines of railway and provide transportation for the produce of the country. The northern division of the



Cape-to-Cairo Railroad passes through Egypt. The Suez Canal receives none of Egypt's products except at its terminals. Telegraph communication between the principal cities and with other countries is complete, there being about 19,000 miles of wire; and a fairly good postal system is maintained.

Government. Until 1914 Egypt was theoretically under Turkish ownership, though actually controlled in important affairs by Great Britain, whose interests there were paramount since the construction of the Suez Canal, constituting the country practically a British dependency. The nominal ruler was called the *khedive*, appointed by Turkey.

In December, 1914, allied interests in the World War decided that Turkey's influence in Egypt should be nullified, for the Turks had been delegated by their German allies to capture or destroy the Suez Canal.

The khedive was deposed, and the British conferred the title of Sultan upon Abbas Hirma, eldest son of a former reigning family. Upon his death Ahmed Fuad Pasha became sultan; the British protectorate was recognized by all the allies of Great Britain in the war. In 1920 the country was given practical independence; but in February, 1922, following a friendly conference between British and Egyptian representatives, the protectorate was declared terminated, and in March, the Sultan was proclaimed King.

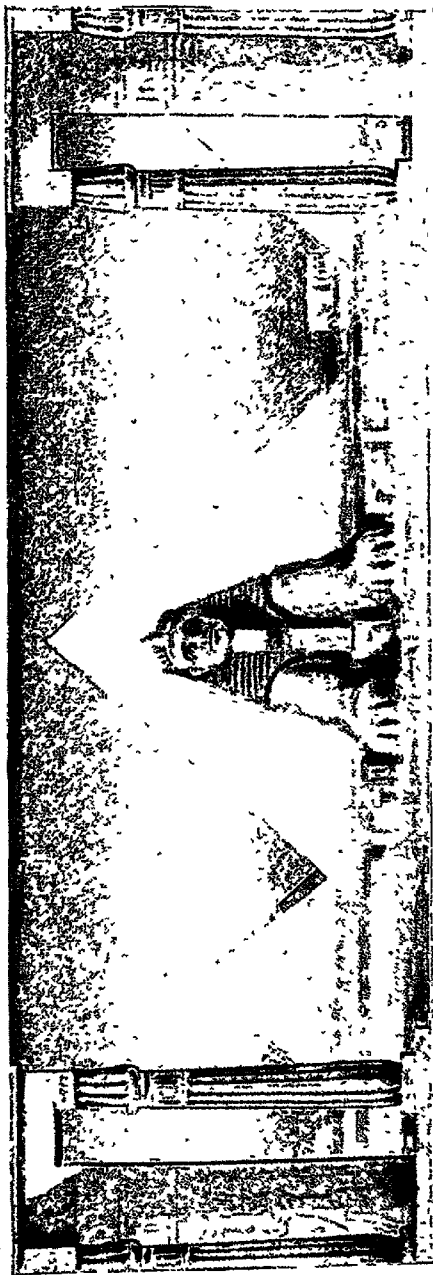
Nominal independence followed, but by agreement Egypt was to be guided in foreign affairs by the British, and the paramount rights of Britain were to be recognized in all matters pertaining to the Suez Canal. In 1929 the demand for complete independence was recognized, but not until 1932 was a new Constitution adopted. From time to time the pressure of the British in protecting their interests has been resented. On Fuad's death in 1936, his minor son, Farouk, succeeded him. In the same year, through a new treaty with Great Britain, Egypt achieved the greatest degree of independence it has enjoyed for centuries. By its terms British troops were withdrawn from cities and centered at airports; Egyptian troops were again to occupy Anglo-Egyptian Sudan; a new Egyptian army will be British-trained. In brief, an alliance, offensive and defensive, has been formed.

History. The Egyptians are the earliest people known to us as a nation. By the be-

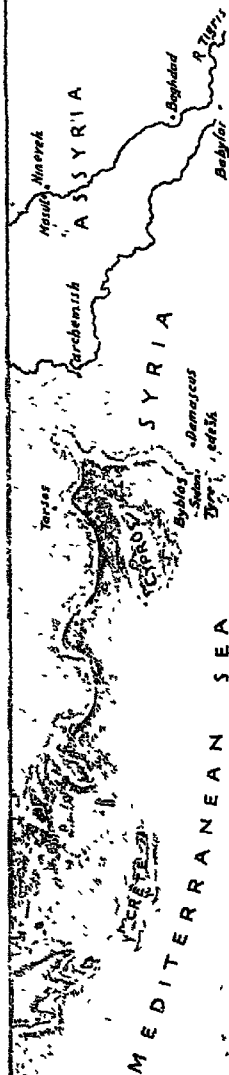
ginning of the fiftieth century, B. C., they were living under a settled government; they had built cities, invented hieroglyphic signs and improved them almost into an alphabet. The arrangement of the Egyptian chronology is still a much disputed point among scholars. A list of the kings, arranged in thirty dynasties, was made by the priest Manetho in the third century B. C., and this division is still used. The fourth dynasty, distinguished as the "Pyramid Dynasty," was the most important in early Egyptian history. It was at its height about 2700 or 2800 B. C. and left as its monuments the greatest of the pyramids. The twelfth dynasty, which seems to have begun about 2000 B. C., exercised a just and able rule over a prosperous country. Literature especially flourished during this period. About 1700 B. C., Egypt was conquered by a people whose rulers were called the Hyksos, or Shepherd Kings. Nothing is known of these people, except that they had first conquered western Arabia and Syria. The Theban princes seem to have preserved a state of semi-independence under the Hyksos rulers and at last a revolt arose which ended by the Shepherd kings being driven out of Egypt by the Theban princes about 1600 B. C. With the expulsion of the Shepherd kings began the reigns of those great Theban kings who built the magnificent temples and palaces at Thebes.

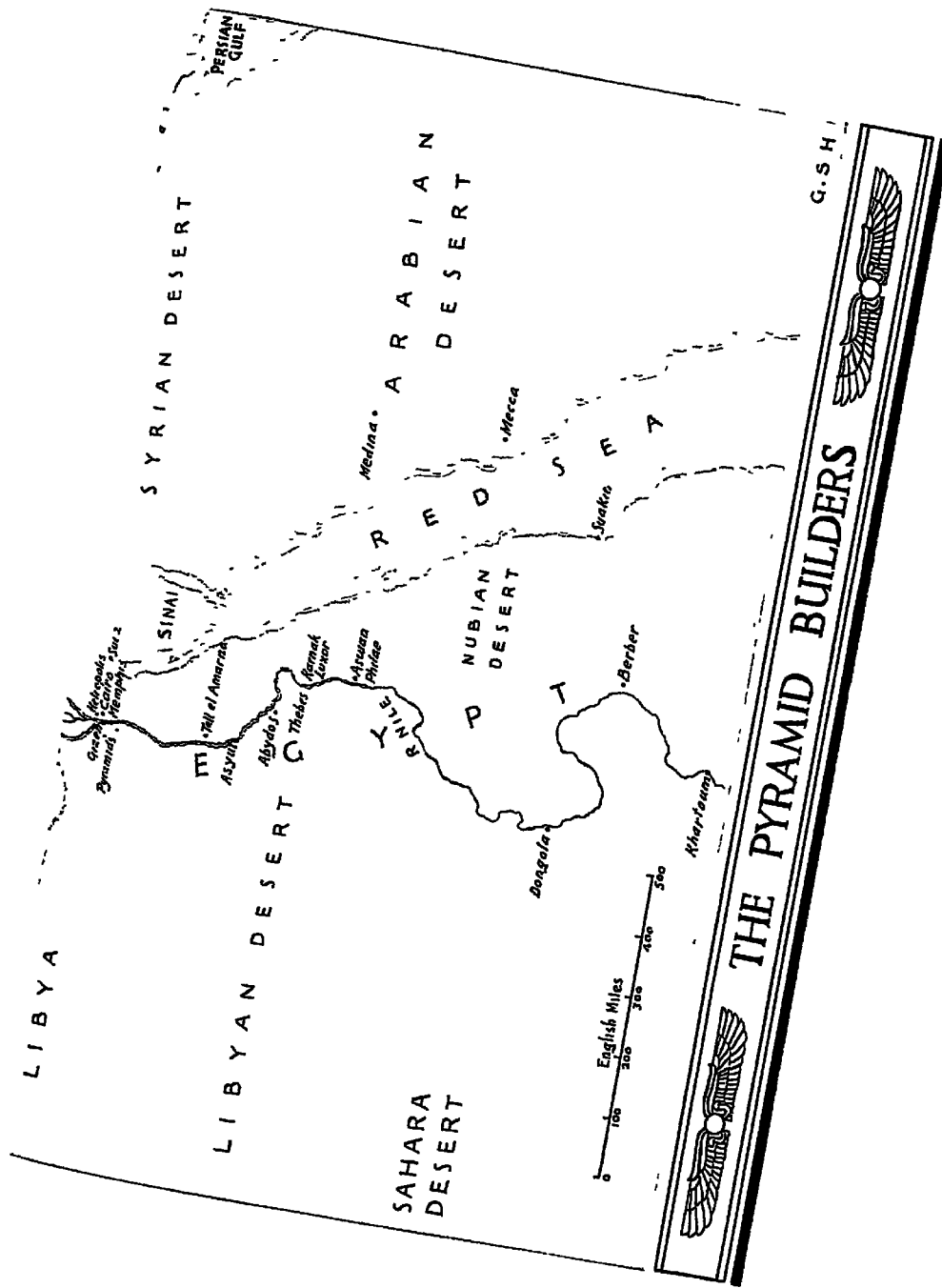
The nineteenth dynasty began with Rameses I. Seti I, the successor of this Rameses, began a war against the Hittites, which was continued under his successor and grandson, the great Rameses II, or Sesostris. Until recently it was believed that Rameses II was the Pharaoh who had oppressed the Hebrews, and that the Exodus occurred under his successor, Menephtah. Under the later kings of the nineteenth dynasty, the Egyptian empire began to decay. The twentieth dynasty began with Rameses III, a strong king, who was followed by a succession of weak rulers, dependent for the most part on their priests. A priest dynasty, the twenty-first, came to the throne with Herhor. He attempted to restore Egyptian rule in the East and conquered Jerusalem. After his death Egypt was torn by civil war, and eventually the Ethiopians conquered it. In 525 B. C. Cambyses, king of Persia, overran Egypt and made it a Persian province. After the Persian defeat at Marathon, the Egyptians arose and recovered their independence for

EGYPT IN THE DAWN OF HISTORY



THE SPHINX





a short time, but were again subdued; and in spite of two other revolts, Egypt remained a Persian province until Persia itself was conquered by Alexander the Great in 332 B C.

Egypt now became a Greek state, and the Egyptians were treated as an inferior race. Alexandria was founded as the new Greek capital. On Alexander's death, his general, Ptolemy, took possession of the throne and became the first of a Greek dynasty that for three hundred years made Egypt one of the chief kingdoms of the world. The Ptolemies were patrons of letters and art, and Theocritus, Callimachus and Euclid flourished under their rule. But while the Alexandrian Greeks managed to keep down the native Egyptians, they were themselves coming under Roman influence. The later Ptolemies were obliged to ask the help of Rome in internal and external troubles, and Cleopatra maintained her power only through her personal influence with Julius Caesar and Mark Antony. On the defeat of Antony by Augustus in 30 B C, Egypt became a province of Rome. It was still a Greek state, however, and Alexandria was the chief seat of Greek learning and science. Gradually the old Greek and Egyptian religions gave place to Christianity, and this is perhaps the most important event in Egypt during the Roman rule.

On the division of the Roman Empire, in the time of Theodosius, into the Western and Eastern empires, Egypt became a province of the latter and sank deeper and deeper into barbarism and weakness. It was conquered in A. D. 640 by the Saracens, under Caliph Omar. Of the Saracen rulers who made Cairo practically the center of Mohammedan influence, the greatest was Saladin. The last Saracen dynasty was overthrown by the Mamelukes in 1250, and the Mamelukes in their turn were conquered by the Turks in 1517. They made repeated attempts to cast off the Turkish yoke, and they had virtually done so by the end of the eighteenth century, when Napoleon conquered Egypt. The French held it till 1801, when they were driven out by the Turks, with the aid of the British.

On the expulsion of the French, a Turkish force took possession of the country, and Mehemet Ali was made pasha. He was a man of great ability, administered the country vigorously and greatly extended the Egyptian territories. At length he rebelled

against the porte, and, after gaining a decisive victory over the Ottoman troops in Syria, was acknowledged by the sultan as viceroy of Egypt, with the right of succession in his family. Mehemet Ali died in 1849 and was succeeded by his grandson Abbas Pasha, who in his turn was succeeded by his uncle Said Pasha, the son of Mehemet. Under the rule of Said Pasha railways were opened and the cutting of the Suez Canal was begun. After Said's death, Ismail Pasha, a grandson of Mehemet Ali, obtained the government (1863). His administration was vigorous, but exceedingly extravagant, and brought the finances of the country into great disorder. In 1866 he received permission from the sultan to adopt the title of khedive. In 1879 he was forced to abdicate under pressure of the British and French governments and was replaced by his son, Tewfik. The so-called national party revolted in 1882 and forced the khedive to flee, but on July 11 a British fleet bombarded Alexandria and restored him. From this time on, although the khedive remained the nominal head of the government, Egypt became practically the protectorate of Great Britain.

A rebellion in the Sudan, under the leadership of the Mahdi, now gave the government trouble. Troops were sent under General Gordon to protect the British interests, but the Mahdi's forces were strong enough to shut General Gordon up in Khartum. For nearly a year he held the town, but he was killed (January 18, 1885) before the relief expedition under Wolseley could reach him. When the expedition withdrew, the Sudan was left in a state of anarchy. In 1896 the Mahdi again threatened Egypt, and the British government again took steps to suppress him. Sir Herbert Kitchener was made commander in chief of the Egyptian army, and in 1898 he won a final victory, which once more brought the Sudan under the rule of the government. In 1892 Tewfik was succeeded by his son, Abbas Hilmi, an able ruler. The recent history of more than local interest appears in the subheading *Government*, above.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Aboukir	Goshen	Nile
Abydos	Heliopolis	Port Said
Alexandria	Khartum	Sut
Assuan	Luxor	Suez
Cairo	Memphis	Thebes

HISTORY

Alexander the Great	Mamelukes
Cleopatra	Pharaoh
Gordon, Charles G	Pharos
Khedive	Rameses II
Kitchener, Horatio	World War

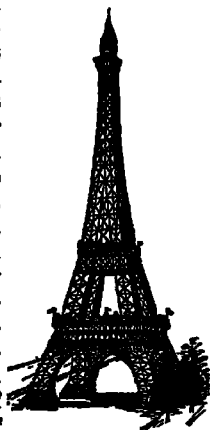
UNCLASSIFIED

Arabs	Philae
Cape-to-Cairo Rail- way	Rosetta Stone
Hieroglyphics	Scarab
Mummy	Sculpture
Papyrus	Sphinx
	Suez Canal

EIDER, *ider*, DUCK, a species of duck found both in America and Europe. The birds abound in Norway and Iceland, where their favorite haunts are solitary rocky shores and small islands. The eider duck is about twice the size of the common duck. The male is for the most part black, but has a white back and head, with a black crown. The female is reddish, and spotted with black, and has two white bands on the wings. The nests are usually formed of drift grass and dry seaweed and are lined with down, which the female plucks from her breast. Eider down because of its warmth and lightness is in great demand for beds and coverlets. One female produces about half a pound of down.

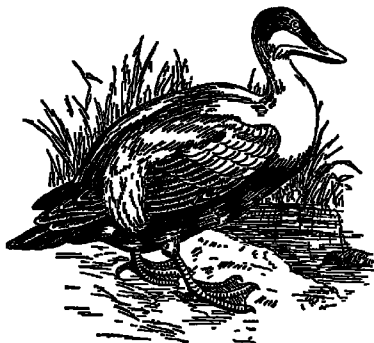
EIGHT-HOUR DAY. See LABOR LEGISLATION.

EIFFEL, *effel*, TOWER, THE, designed by Gustave Eiffel, stands in the Champ de Mars, Paris. It was completed in 1889 and was designed as the leading architectural feature of the Paris Exposition of the following year. Its base is 330 feet square and the support is four iron columns which rest upon massive masonry. It is 986 feet high, and for more than 50 years held the record of being the tallest structure in the world. There are platforms at 189 feet, 380 feet and 906 feet, which can be reached by elevators and by stairs. The first platform contains restaurants, the third is partially devoted to an experimental station of the weather bureau of France and to a wireless telegraph station. The tower contains 7,300 tons of iron and steel and cost \$1,000,000.



EIFFEL TOWER

EINSTEIN, ALBERT (1879-), a German-Swiss physicist, famous author of the theory of relativity. He was born in Ulm, Wurttemberg, Germany, and spent his boyhood in Munich, where his father owned electro-technical works. He went to a cantonal school at Aarau in Switzerland, and later attended lectures while teaching mathematics and physics at the polytechnic school at Zürich. He became a Swiss citizen and was



EIDER DUCK

examiner of patents at Berne until 1909.

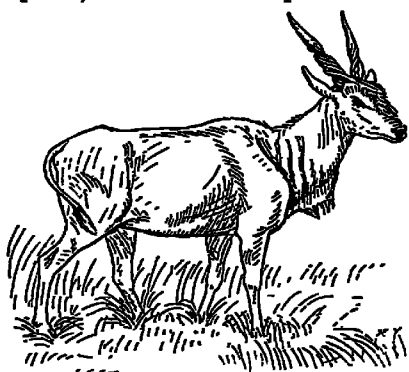
He was appointed professor at the University of Zurich, and in 1913 a special position was made for him as director of the Kaiser-Wilhelm Institute in Berhn. He received the Nobel Prize in 1921.

Einstein's important work touches so many branches of physics that only a part can be here indicated. He is best known by the theory of relativity, which he developed in successive papers beginning in 1905. The theory is a highly technical mathematical formula to explain the fundamental forces of nature—space, time, etc. In a series of papers (1905 to 1911) he developed his "light-quantum" hypothesis, which assumes that radiation when propagated has a "quantum-like" structure. The Hitler government in Germany confiscated his property (and that of other prominent Jews), he fled to the United States, finding asylum for continuing his work at Princeton University. He applied for American citizenship in 1935.

ELAND, the Dutch name for a large African antelope. It is the size of a full-grown horse. The animal is hunted for its hide, which is used for harness, and for its flesh, which is suitable for the table. It is gentle and easily captured, and consequently is becoming exterminated. See ANTELOPE.

ELASTICITY, *elas tis' it*, the property of matter by virtue of which a body tends to resume its original form when the outside force by which it was deformed is removed. Nearly all substances are elastic, but some are much more so than others. Gases are the most elastic, and liquids the least. Hard solids, such as iron, steel and marble, are more elastic than soft ones like dough, putty and lead. Whenever a substance is compressed or extended beyond the limit of its elasticity, it will not resume its former shape. This is often illustrated by rubber bands that have for some time been stretched to a high degree of tension. Such bands lose their elasticity. By compressing gases with a sufficient force, most of them can be changed into liquids. In some instances these liquids return to the gaseous form as soon as the pressure is removed, while in others they do not.

ELBA, a small island in the Mediterranean Sea, belonging to the province of Leghorn, Italy, separated from the mainland by the Strait of Piombino, six miles wide. This island is eighteen miles long and from three to ten miles broad, and is traversed by mountains, which rise to a height of over 3,000 feet. It yields iron, marble, granite and salt, and produces grapes and other fruits. It has two seaports, Porto Ferrajo, the capital, and Porto Longone. The Treaty of Paris in 1814 made Elba a sovereignty for Napoleon, who lived there a prisoner from



ISLAND

May 4, 1814, to February 26, 1815. He escaped and made his way back to France, assembled his armies and for a hundred days fought again for supremacy in Europe. See NAPOLEON I.

ELBE, a river of Germany, one of the largest in Europe. It rises on the slopes of the Schneekoppe, one of the highest summits of the Riesengebirge, between Bohemia and Silesia. Its length, including windings, is about 780 miles, and its mouth is on the North Sea, at the port of Cuxhaven. Its chief affluents are the Moldau, Eger, Saale, Mulde and Havel, and the chief cities on its banks are Dresden, Torgau, Wittenberg, Magdeburg and Hamburg. The Elbe is navigable for ocean vessels as far as Hamburg, which is thus a mighty ocean port, eighty miles from its mouth, and is connected with important cities in its basin by a network of canals. It is one of the most important commercial rivers in Germany.

ELBERFELD, *el ber felt'*, GERMANY, formerly a city of Rhenish Prussia, a few miles east of Dusseldorf, with 165,000 population, now joined with Barmen (188,000) in the city of Wuppertal, which with suburbs had in 1933, 408,404 people. Elberfeld has prospered as a cotton-manufacturing center; other industries are largely allied with cotton, but in addition it is the chief German city in the manufacture of haberdashery, fine chemicals and dyes; the making of stained glass has been a notable industry for many years. The city's commerce is very extensive, and the town is an important railroad center, lines extending in every direction.

ELBURZ, *el boorz'*, a lofty mountain range, extending over Northern Persia, parallel with, and overlooking, the Caspian Sea. The highest peak is Mount Demavend, 18,500 feet; the average height of the range is 7,000 feet.

EL CANEY, *el kah' nay*, BATTLE OF, a battle of the Spanish-American War, fought July 1, 1898, between 4,500 Americans, under General Lawton, and about 500 Spaniards, well-entrenched, under General Vara de Rey. The battle was one of the few important land contests of the war, was fought desperately and caused a loss of more than 400 men on each side. The Americans won the day. See SPANISH-AMERICAN WAR.

ELDER, a name given to several species of small trees or shrubs, which have opposite leaves, with finely-cut edges, and bear small white flowers in large conspicuous flat-topped clusters. The berries are black or red in color and somewhat bitterish in taste, though they are sometimes used in making pies and

a kind of wine. Some varieties of elder are cultivated because of their beautiful foliage and handsome shape. The branches are woody on the outside, but the whole center is filled with a white pith. The wood of the European species is tough and hard and takes a good polish.

EL DORADO, *el doh rah'doh*, a name severally applied to a former king of South America, to a fabled gold city and to a country reputed to be immeasurably rich. The Spaniards spent large sums of money in attempts to discover the city and country; the most noted expeditions were those of Diego de Ordaz in 1531. The name is now used to designate any place of fabulous wealth.

ELEOAMPANE, *el e kam pane'*, a plant of the natural order Compositae, found in North America, Europe and Asia. It is three or four feet high and has root leaves often two feet or more in length. The flowers are large and yellow. The root, which is perennial, and possesses a bitter, camphor-like taste, is used in the manufacture of absinthe.

ELECTION, *e lek'shun*, in government, is the process by which officers are chosen to manage public affairs. Some of these secure their positions by appointment, and not by election; the number actually elected is decreasing from year to year, as better means of securing responsible government are adopted.

That the will of the majority shall always prevail, and that votes shall be uninfluenced so far as safeguards can protect them, elections are conducted by secret ballot. The best system of balloting yet tested is the Australian ballot, which provides punishment for the person found outside his voting place with a legal ballot in his possession.

As a general rule only citizens may participate in an election. However, in some states aliens who have received only their first naturalization papers may vote in all state elections. This results in their legal participation in the election of members of the United States House of Representatives, for the Federal Constitution declares that any person qualified in the state to vote for state representative the United States government will accept as a qualified voter for Representative in Congress.

In no state may a person vote until twenty-one years of age; no lunatic may participate in an election, neither may a person who is

under the influence of liquor. In case of removal from one state to another a residence there of one year is usually required to establish the right to vote; in a county, thirty days, in a township or ward, ten days, is required, if removal is from one county, township or ward to another in the same state. In times past, when women lacked legal standing, a female citizen was called *citess*. There is now no law, however, limiting the word *citizen* to mean males. In states where election privileges are restricted to males, such designation is clearly made. Wherever women are given the right to vote, the word *male* is stricken from existing laws or constitutions, and women are then legally recognized as on the same political plane as men.

People are called upon to vote upon other matters than the election of men and women to public office. When a city, village or county wishes to borrow a large sum of money and issue bonds for payment at a future date the voters at an election determine whether it shall be done.

Each political party in most states now selects from a mass of candidates those it desires to nominate for public office, by submitting their various merits to party vote in what is known as a *primary* election. In some jurisdictions no law may be placed upon the statute books until the voters, by referendum, have approved it. Sometimes, too, they are called upon to decide whether an official shall be removed from his position because of alleged misbehavior or failure to conduct properly the affairs of his office. The law providing for such an election is known as *recall*.

Related Articles. Consult the following titles for additional information:	
Australian Ballot	Primary, Direct
Ballot	Recall
Citizen	Referendum
Electoral College	Short Ballot
Initiative	Voting Machine
Naturalization	Woman Suffrage

ELECTIVE STUDIES, a term that has come into common use in recent years to indicate courses of study in high schools and colleges which may be chosen, or elected to be taken, by the students. The development toward election has been slow, and there have been notable reactionary movements, but few institutions now adhere absolutely to one unchangeable curriculum. The advantage of the elective system is the freedom which it gives students to develop along the lines of

their special strength or inclination. The danger lies in abuse of this freedom—the election of courses that are easy but have little disciplinary or instructional value. To obviate this disadvantage, several methods have been used, such as the division of the courses into groups, each student being required to choose a certain amount of work from each of these groups, and the assignment of members of the faculty as advisers to the students. Practically all of the American state universities have adopted the elective system, and most of the new privately endowed institutions, as well as some of the older ones, are rapidly extending their elective courses. The proportion of elective courses offered varies from one-fourth to one-half of the whole course.

ELECTORAL COLLEGE, in the United States, a body of men chosen by the qualified voters of the several states to elect the President and Vice-President. The number of electors chosen by each state is equal to the whole number of members that the state sends to both houses of Congress. No Senator or Representative or person holding an office of profit or trust under the United States can be chosen as an elector.

The day on which electors are chosen must be the same in all states—the Tuesday next after the first Monday in November. This is the day on which it is incorrectly declared that we vote for President and Vice-President. The electors meet in their respective states on the first Monday after the second Wednesday in December and vote by ballot for President and Vice-President. They then make distinct lists of all person voted for as President and Vice-President, and of the number of votes for each; these lists they sign, certify and transmit, sealed, to Washington, directed to the president of the Senate, who opens them in the presence of both houses of Congress, on the sixth day of January, Congress having convened on January 3. A majority of the whole number of electoral votes is necessary to elect.

If no candidate for President has a majority of votes, the House of Representatives must choose for President one of the three persons having the highest number of votes. The Senate in turn, will then choose a Vice-President. The electors no longer use discretionary powers, as planned by the Constitution makers, but cast their votes for the candidates previously nominated by their

respective parties. See **PRESIDENT**; **VICE-PRESIDENT**.

ELECTORAL COMMISSION, a commission appointed by an act of Congress in 1877 to investigate the returns of electoral votes from Florida, Louisiana, Oregon and South Carolina, by which would be determined the Presidential election of 1876. The commission numbered fifteen members, consisting of three Republican Senators, two Democratic Senators, three Democratic Representatives, two Republican Representatives and five Associate Justices of the Supreme Court.

It was apparent that the commission was evenly divided between the two parties, with the exception of the fifth justice, Bradley, who had taken the place of Justice Davis of Illinois. However, he cast his vote with the Republican members and decided against the Democratic claim that the commission should go behind the returns and investigate charges of fraudulent voting and manipulation of returns. This point being determined, the commission in every case sustained the validity of the Hayes electors, thus deciding the election in favor of Mr. Hayes and against Mr. Tilden. See **UNITED STATES OF AMERICA**, subhead *History*; **HAYES**, **RUTHERFORD BURCHARD**; **TILDEN**, **SAMUEL JONES**.

ELECTORS, **GERMAN IMPERIAL**, those German princes who had a voice in the election of the German emperor (see **GOLDEN BULL**). Originally the number was seven, but in 1648 it was increased to eight and in 1692 to nine.

ELECTRA, *e lek'trah*, in Greek legend, the daughter of Agamemnon and Clytemnestra, the sister of Orestes and Iphigenia. She does not appear in Homer, but was a favorite character in later literature. Her story is the subject of plays by Aeschylus, Euripides and Sophocles. There are many variations in the treatment of the legend, which, in its broad outlines, is as follows: After the murder of her father on his return from the Trojan War by Clytemnestra and Aegisthus, Electra saves the life of Orestes by sending him out of the country. Grown to manhood Orestes returns and slays both Clytemnestra and Aegisthus.

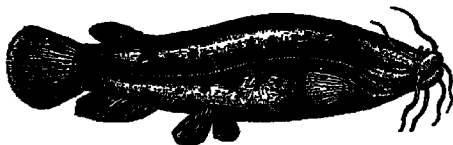
ELECTRICAL FISH, any fish that gives an electric shock. One of the best known is the electric eel, a native of South America. It is of nearly equal thickness throughout and grows to the length of six feet. A species of catfish about four feet long that lives

in the Nile, and several species of torpedoes, one of which is sometimes found on the eastern coast of the United States, are electric.



ELECTRIC EEL

The seat of the four organs that give the shock is believed to be on the under side of the tail. After a few discharges, the current



ELECTRIC CATFISH

is weakened, and an interval of rest is required for a new storage of force.

ELECTRIC BATTERY, a device for generating electric current by chemical action. Technically, a single unit as described below is a cell, while several used together constitute a battery. A cell which will generate a current can be made from pieces of any two different metals, or of a metal and carbon, the *electrodes*, and a glass or porcelain cup containing a solution, the *electrolyte*, which will act chemically on one of the plates. Any of the common acids, bases, or salts may be used to make up the electrolyte. Of course, certain combinations of electrodes and electrolyte give more current, or deliver current longer than others.

Simple Cells. Simple cells for experimentation are usually made by stirring about a tablespoonful of concentrated sulphuric acid slowly into a glass of water (never the reverse), and inserting a strip of copper and one of zinc into the solution. If the upper ends of the two strips or electrodes are connected by a wire, an electric current will flow through the wire. This current can be detected by connecting one piece of bare copper wire to each plate and touching both wires to the tongue at the same time without allowing them to touch each other. A peculiar taste will be noticed, which is due to the chemical action of the current. Another device for detecting a small current from an experimental cell may be made by suspending a magnetic needle or compass needle inside a coil of wire which stands on edge in

a north-and-south direction. See GALVANOMETER.

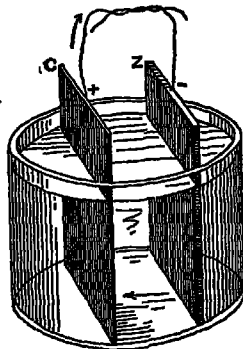
Careful examination will show that, in the simple cell described above, the zinc has a negative charge, and the copper is positively charged. It is customary to consider the current as flowing from the copper, or positive, electrode to the zinc. However, it is now known that the negative charges, or *electrons*, move and are thus, in reality, passing through the wire from zinc to copper because of the electrical pressure or electro-motive force due to their abundance on the zinc plate. But how did so many electrons get on the zinc? Wide observation shows that the negative plate of a cell is always used up by chemical action as the current is being produced. In a zinc-copper-sulphuric acid cell, the zinc disappears and a new compound, zinc sulphate, is found in the solution.

It can be further shown that the zinc atoms in the zinc sulphate have a positive charge. The action of the electrolyte on the zinc is therefore thought to cause the atoms of zinc to go into solution as positively

charged particles, or *ions*, each one leaving some negative electricity on the zinc plate. When the connections between the plates are made, the electrons pass around to the copper plate, because of the low electrical pressure there.

During the time the current is passing, bubbles of a gas, hydrogen, can be seen forming on the copper. These come from the hydrogen ions of the sulphuric acid, which have been discharged by receiving electrons from the copper plate. Some material is always deposited on the positive plate. Very often it is hydrogen. The bubbles of hydrogen in this case interfere with the flow of current, and are said to *polarise* the cell. Many cells furnish a large current when first used, but the current soon dies down because of polarization.

Impurities in the zinc used for a simple



A SIMPLE BATTERY OR CELL

cell usually cause the chemical action to go on when the zinc alone is placed in the acid. This can be avoided by *amalgamating* the zinc electrode, that is, by coating it all over with mercury while still wet from the acid.

Another simple and rather effective cell is made by placing zinc and carbon electrodes in a glass jar containing a rather concentrated solution of ammonium chloride (sal ammoniac).

The Dry Cell. The dry cells which are used for flashlights, radios, bells, etc., are made from essentially the same materials as the ammonium chloride cell mentioned above. A zinc cup is lined with blotting paper or cloth and packed full of a *wet* paste containing ammonium chloride and other chemicals. In the center of this mass is placed a carbon rod which projects above the top of the cup. Sealing wax or pitch poured over the top of the paste prevents spilling and keeps the moisture from evaporating. The dry cell is now more widely used than any other type of cell except the lead-sulphuric acid storage cell (see below).

Many types of cells have been devised for special purposes. Some are described under **BUNSEN BATTERY** and **DANIELL CELL**. Others are discussed in physics books and books on electricity.

Storage Batteries. The type of cell which has just been described is known as a *primary* cell. New chemicals must be used for each cell and when exhausted are of no further use for the production of current. *Secondary cells*, or *storage cells*, can be renewed by "charging," that is, by sending a current from a dynamo through them in the direction opposite to that which they produce. By electrolysis (which see) chemical changes take place in the electrolyte and plates, by which they are restored to the charged condition.

A simple lead storage cell may be made by placing two plates of sheet lead two inches wide in a tumbler or jar containing a solution of one part of sulphuric acid to four parts of water. The cell is charged by sending a current through it from three or four dry cells connected *in series* (see below). Bubbles appear on both plates, and one becomes brown in color. If the dry cells be disconnected and an electric bell put in their place, the bell will ring vigorously for a time. The charging and discharging can be repeated indefinitely. This simple cell does not remain in the charged condition for any length of time,

even though it is not used. For practical purposes the lead storage cell has one plate of spongy lead and one of lead peroxide. As the battery is discharged, much of the acid in the electrolyte disappears, and both plates change into lead sulphate. The charging current changes one plate back to lead, the other to lead peroxide. In discharging, the battery transforms its chemical energy into the energy of the electric current, during the charging operation the reverse takes place. Thus, the storage cell does not store electricity, but chemical energy.

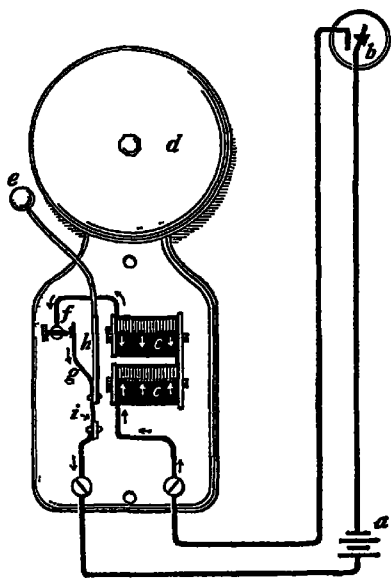
Storage batteries are very widely used in the modern world. Automobiles, trucks, and airplanes carry a storage battery to start the gasoline motor by running an electric motor. The battery is recharged from a generator while the gasoline motor is running. Submarines use storage batteries for motive power while submerged. Electric automobiles and delivery trucks are driven by storage batteries and electric motors, and the batteries are charged while the cars are not in use. Many mine locomotives are driven by storage batteries, for they give off no noxious gases. Small power stations use storage batteries for reserve power. Electric-lighting systems for isolated homes have storage batteries to supply the usual needs for current. During periods of charging or unusual demand, a generator is driven by a gasoline engine.

How Cells Are Connected Together. The cells of a battery may be connected in either of two ways, or by a combination of the two. The most common plan is to connect the cells *in series*, that is, in such a way that the current goes through first one cell and then another in a series, each one adding its own electro-motive force to that of the others. By this plan the negative electrode or terminal of one cell is connected to the positive terminal of the next, and so on for any number of cells.

In the *parallel*, or *divided circuit*, plan, all the negative terminals are connected together, and all the positives are similarly connected one to another. Then a wire leads from each side to the terminals of the device to be operated. By this method the current is divided, only part going through each cell. The voltage is only the voltage of one cell, but the amount of current is very large, if the resistance of the device being operated is small. The best connection for any particular circuit depends on the characteristics

of the circuit, and may often be easily determined by experiment. See **ELECTRIC BELL**; **ELECTRICITY**.

ELECTRIC BELL, a bell rung by electric current, usually as a signal from some person or mechanism at a distance from the bell. The essential features of the ordinary electric door bell and its circuit are shown in the illustration. The two dry cells represented at *a* serve as the source of current. However, in many homes supplied with alternating current for lighting, a bell-ringing transformer supplies current for the door bells. When the push button *b* is pressed, current flows through the wires to the electromagnet *c*, *c*, which pulls the armature *h* to the right. This movement causes the clapper *e* to strike the gong. At the same time, however, the spring *g* is pulled away from its contact with the



AN ELECTRIC BELL

screw at *f*. The breaking of this contact stops the flow of current, and the magnet releases the armature, which returns to its first position. As soon as *g* makes contact with *f* again, the magnet acts, and the cycle is repeated, so that the bell rings as long as the button is pressed. School call bells, burglar alarms, and buzzers operate in this same manner, except that, in the case of the buzzer, no gong and clapper are provided.

Single-stroke bells which are used for signalling have a clapper which strikes the

bell once each time the button is pushed. Telephone bells are especially designed to ring when supplied with alternating current from a hand-operated magneto in rural districts, and from a central supply in cities.

ELECTRIC CLOCK, a clock driven or controlled by electricity. There are several widely different types. One type is arranged so that the spring which drives the clock is automatically wound by a motor or an electromagnet at frequent intervals. Thus the driving force is kept practically the same at all times. The clocks which have recently come into wide use and which are operated by connecting them with the lighting circuit are driven by synchronous motors. These motors run in time with the pulsations of the alternating current used in most cities (60-cycle). Regulation is accomplished by careful control of the speed of the generators in the power stations.

Some electric clocks are so connected with a central timepiece that the hands are adjusted at frequent intervals to agree with those of the regulating clock. Another very successful plan is to have all the clocks in the system operated from the regulating clock. In such a system there is but one complete clock, and all of the others are simply dials, with a small amount of wheelwork and an electromagnet which moves the hands up once each minute, when an impulse is received from the master clock.

ELECTRIC HEATING. All substances resist the flow of electric current to some extent; that is, all materials possess electrical friction, or electrical *resistance*. Whenever current is driven through a conductor against this resistance, part of the energy of the current is transformed into heat energy, just as a portion of all mechanical energy expended is wasted in overcoming friction. The rate at which a conductor is heated is proportional to the resistance of the conductor and to the square of the current intensity (number of amperes). Thus, a conductor with a resistance twice as high as that of another will, with the same amount of current, produce twice as much heat in a given length of time. However, if two wires have the same resistance, but one has twice as many amperes of current flowing in it as the other, the one with the larger current will give off four times as much heat in a given time as the other. If both resistance and current be doubled, the rate of heating increases eight times.

The principles just stated are employed in a great variety of ways, both in preventing undue loss of energy in conducting wires and in producing heat where it is desired. Where heating of the conductors is to be avoided, as in transmission lines, large wires of low resistance (copper or aluminum) are used, and the voltage is made very high so that the number of amperes carried may be correspondingly low. On the other hand, when much electrical energy is to be changed into heat, a large current is sent through a substance which has a high resistance. Irons, toasters, and stoves usually have a resisting wire in the form of coils placed close to the material to be heated. One type of stove has the heating "element" in the form of a rod which contains the resistant path for the current. Electric light bulbs contain a fine wire which becomes hot enough to give out light because of its high resistance. A fuse protects an electrical circuit from becoming overheated and setting fire to its surroundings because the fuse wire has a high resistance and a low melting point. The heat developed in the fuse by an overload melts it and breaks the circuit before any other part becomes dangerously hot. The electrical heating of homes has not become practical because of the cost of the large currents required.

Electric Furnaces. Three types of electric furnaces have been developed for laboratories and industry, the *arc furnace*, the *resistance furnace*, and the *induction furnace*. In the first, huge rods of carbon are used much as they are in the arc light (See **ELECTRIC LIGHT**). The arc is produced in a space which is insulated against loss of heat, and extremely high temperatures are reached for melting iron, steel, and other metals and for performing scientific experiments. The resistance furnace contains high resistance wire or other material which becomes very hot, as does the resistance wire in ordinary heating devices such as the electric iron. In some important chemical reactions involving coke at high temperatures, the coke itself forms the resisting path for the current. The induction furnace is used for heating conductors such as metals. An alternating current of extremely high frequency is sent through a coil surrounding the material to be heated. The changing magnetic field created by this current induces large currents in the material which, because of its resistance, is raised to a high temperature. See **ELECTRO-MAGNETISM**.



ELECTRICITY, a term variously applied to electrical charges, electric currents, and to the fields of science and of engineering which deal with electrical phenomena.

If a warm piece of glass such as a lamp chimney, bottle, or rod is rubbed with a silk cloth, or if a stick of sealing wax or a fountain pen is rubbed with a woollen cloth, the object which has been rubbed attracts bits of paper or dry sawdust. Numerous substances show the same peculiar property. This behavior was known to be exhibited by amber in the days of Thales, a Greek philosopher who lived six hundred years B. C. The Greeks called amber *electron*, and from that has come our word electricity.

If a small ball be made from the dry pith of a plant and hung up by a silk thread, some of the facts and laws of electrical phenomena may be observed (see **ELECTROSCOPE**). A stick of sealing wax rubbed with wool will attract the pith ball. Allowed to come in contact with the wax and rub along it for a moment, the ball seems to "change its mind" and is repelled just as vigorously as it was attracted at first. Try as we may, without actually holding the ball, it avoids the charged sealing wax. However, if a glass rod, which has been rubbed with silk, be brought near, the ball is again attracted. If all substances which can be electrified be tested with the ball which has touched the sealing wax, some will be found to attract it and the others to repel it. All substances which repel the ball, and thus behave as does sealing wax rubbed with wool, are charged with one kind of electrical charge which has been called *negative* since the days of Benjamin Franklin. Those bodies which attract the charged ball have *positive* charges. From the behavior of the ball in the experiments which have been outlined, it may be seen that *like charges repel*, while *unlike charges attract*, each other.

The Electron Theory. One early theory held that there were two kinds of weightless fluids in substances, and that if a body had an excess of one fluid it was positively charged, and if it had an excess of the other, it was negatively charged. A later theory

was that there was only one kind of fluid, and that bodies which were positively charged had an excess of the fluid, while those which were negatively charged had less than the normal amount of the fluid. The modern theory is practically the same as the one just described, except that it has been discovered that negatively charged bodies have an excess of something while positive bodies are deficient.

By very ingenious and exact experiments, scientists have discovered that all matter contains tiny particles of negative electricity which are called *electrons*. These electrons are inconceivably small. More than 1,800 of them are required to weigh as much as one hydrogen atom, and there are 303,000,000,000-000,000,000,000 atoms in a gram of hydrogen gas. It is further believed that these tiny electrons are parts of the atoms themselves, rotating about much heavier, positively charged nuclei, like planets about the sun. Ordinarily a piece of sealing wax contains just enough of the negative electrons to maintain an electrical balance with the positive charges of the atomic nuclei. In some way, when it is rubbed with wool, the wax takes some electrons from the wool and becomes negatively charged, while the wool is left positively charged.

Conductors and Non-Conductors. It has been found that if a charged body be rubbed with a piece of metal, the charge disappears, and it can be shown that it passes away through the metal. It seems that the metals allow the electrons to pass from atom to atom with little difficulty, while such substances as rubber, sealing wax, and glass do not do so. The metals are *conductors* of electricity, and the other materials named are *non-conductors*, or *insulators*.

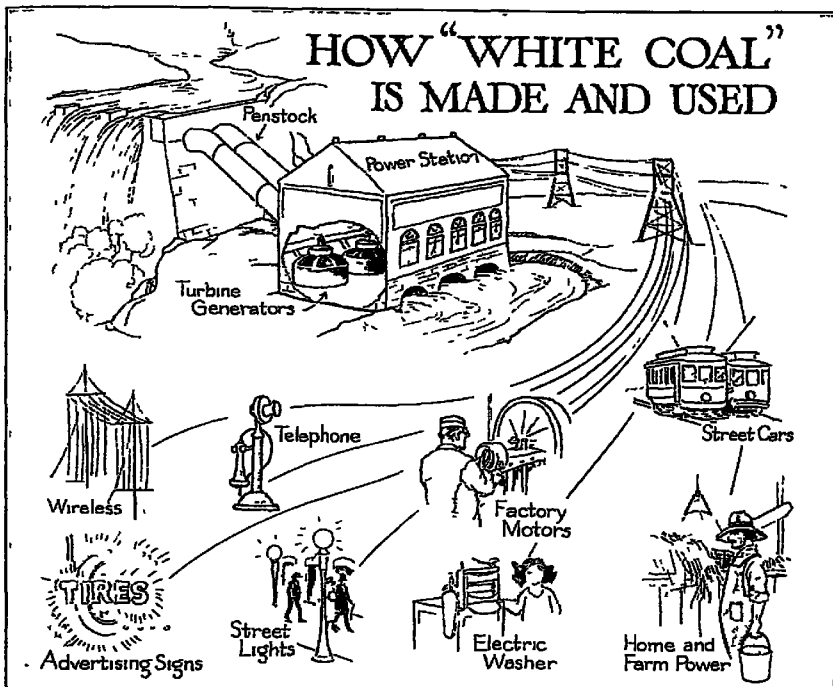
Static Electricity versus Electric Currents. From what has been said, it will readily be seen that an electric current is a stream of innumerable electrons passing along a conductor, while negatively charged bodies have an excess of electrons and positively charged bodies have less than the normal number. There is thus no essential difference between electrical charges on bodies, or *static electricity*, and electric currents except such properties as may be acquired by reason of the motion of the electrons.

Static Electricity. A number of experiments with so-called static electricity have already been described. A keen observer

will be able to see many interesting instances of static electricity when the air is dry, as it is in the winter time. Sheets of paper which have been pressed or rubbed against a varnished table are difficult to pick up. Combs and hair both become charged when one combs his hair. Walking downstairs on a carpet may so charge one's body that he will be shocked when he touches a doorknob. It is even difficult to brush one's clothes clean, for bits of lint become charged and insist on clinging to the cloth. The lightning of summer is our most spectacular display of static.

The Generation of Electric Currents. Although static electrical phenomena are interesting and important, it is the control and application of electric currents which has wrought the greatest of miracles in the last seventy-five years. Each body in the universe has a certain electrical pressure, or *potential*, with respect to any other body. Whenever two bodies having different potentials are connected by a conductor, the difference of potential, or *electro-motive force*, will tend to make electrons flow from one to the other to equalize the potentials. To cause currents to flow, it is then necessary to raise the potential of one body or part of a body with reference to another body or to a part of the same body. This requires the expenditure of energy of some kind, and there are a number of practical ways of accomplishing it. The earliest known method other than the use of friction was that of causing a current to flow as a result of chemical change and the expenditure of chemical potential energy (see **ELECTRIC BATTERY**). The second method to be used was that in which a conductor is moved through a magnetic field or a field is moved past a conductor. In most cases this requires kinetic energy. It is the method most widely used and most important in electrical systems today (see **DYNAMO-ELECTRIC MACHINE**; **ELECTRO-MAGNETISM**; **MAGNETO-ELECTRIC MACHINE**). More recently discovered methods which have less important applications than the first two, utilize differences of temperature (see **THERMOELECTRICITY**) and light (see **PHOTOELECTRIC CELL**), to generate currents.

Currents produced by these different influences may flow in the same direction all the time as *direct current* (D. C.), or they may flow first in one direction and then in the other as *alternating current* (A. C.).



Whatever the duration of our supply of coal and oil, there is no doubt of the rapidly increasing cost of these fuels. We must have more and cheaper power. There is everywhere, or within reach, a source of never-failing power. The rivers of North America represent a force, if harnessed, equal to the hard daily work of 1,800,000,000 men. Every year we are using more and more of this water power to generate electric power. At Niagara alone 580,000 horse power are now generated. A horse power equals the hard steady work of ten men (when those ten men feel like working).



Courtesy, Niagara Falls Power Company

Through these huge tubes rushes the water after a 215-foot drop from the Niagara River above the Falls. The water whurls the turbines that operate the dynamos that generate 130,000 electric horse power that furnish light, heat and power for the factories and homes of a great city.



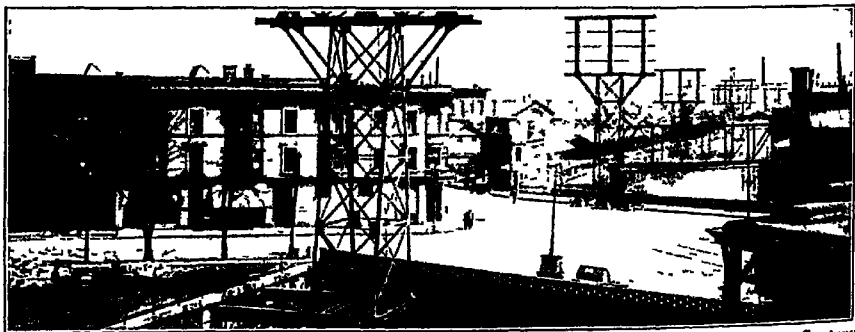
Courtesy Niagara Falls Power Company

These generators produce 37,500 electric h. p. each. Since no eight-hour day limits them, they work twenty-four hours a day, 365 days a year, as long as the river flows. When we shall have harnessed all the flowing rivers of the country we shall have no further need of **BLACK** coal.



Courtesy Niagara Falls Power Company

When electric current is to be transmitted a long distance the voltage or "punch" must be raised, or "stepped-up." In this transformer room the voltage is stepped-up from 1,200 to 22,000, so that the current may be distributed with the least waste or loss to cities, towns and villages over a wide area.



Courtesy Niagara Falls Power Company

The five stations of the Niagara Falls Power Company now generate 410,000 horse power. The engineers of this Company had to solve the problem of how best to transmit a current of high voltage through a compactly built city. Note the ingenious use made of the space over the diversion canal, which brings water from above the Falls to the turbines below.

Chemical action, heat, and light usually create direct currents, while electro-magnetic influence usually results in alternating currents. Alternating currents may be changed to direct currents by devices called *rectifiers*. Each kind of current has its own advantages and problems in control and use.

Use of Electric Currents. The methods of utilizing electric currents correspond very closely to the different ways of generating them. By passing current through properly arranged apparatus, chemical changes are brought about (see **ELECTRO-CHEMISTRY**; **ELECTROLYSIS**, **ELECTROPLATING**). Every electric current creates about itself a magnetic field. By combining and reinforcing the magnetic fields about conductors, powerful magnetic forces are set up and used to create motion (see **ELECTRIC MOTOR**, **ELECTRO-MAGNET**). Every electric current has a heating effect. This property is used to produce heat and light which make the world a better place in which to live (see **ELECTRIC HEATING**, **ELECTRIC LIGHT**).

The Future of Electricity. So widely does the electric current minister to our needs that the present time is popularly called the "Electric Age." Yet it is undeniably true that we are not far past the beginnings of the triumphs of man in his application of this remarkable power. Steam power is rapidly passing, manual labor is lessened already very materially. Notwithstanding all that has come to pass, those who know advise us that the wonders of the future will surely eclipse anything that has amazed the present generation. Within a comparatively brief time city homes will be heated by electricity at low cost, steam locomotives will eventually be supplanted by those with electrical power, as is already true on numerous rail lines. The housewife will have many new electrical devices which will eliminate labor; the workman will turn electric switches and find much of his labor performed by this unseen power.

Related Articles.	Consult the following
titles for additional	information
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Cable, Submarine	Electric Motor
Cathode Rays	Electric Railway
Crookes Tubes	Electro-Chemistry
Davy, Sir Humphry	Electrocutation
Dielectric	Electrode
Dynamo	Electrolysis
Edison, Thomas A.	Electro-Magnet
Electric Battery	Electro-Magnetic
Electric Bell	Theory of Light
Electric Clock	Electro-Magnetism
Electric Heating	Electrometer
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Electric Machine	Electrophorus

Electroplating
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Faraday, Michael
Galvanism
Galvanometer
Induction, Electric
Induction Coil
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Magnetism
Marconi, Guglielmo
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Telephone, Wireless
Thermoelectricity
Vacuum Cleaner
Volt
Volta, Alessandro
Watt
Welding

ELECTRIC LIGHT. Millions of fathers and mothers living today remember well the time they first saw an electric light. They marveled at the wonderful power that traveled along a small copper wire and entering a plain glass globe turned night into day. Now, when steady-burning, powerful lights, shaded in porcelain globes, are among the commonest objects in all cities and in many village and farm homes, it is difficult to realize that until 1870 electric lights were practically unknown and not until 1885 did their use become at all wide-spread.

The Arc Light. Light is obtained from electric current in two ways—first, by heating some substance until it becomes hot enough to give out light, that is, becomes *incandescent*, second, by causing a discharge of electricity to take place through a gas in such a way that the electrical disturbance causes the atoms of the gas to give out light. The electric arc combines these two methods. The principle of its action was discovered by Sir Humphry Davy in 1810. He found that when two pieces of charcoal which were connected with opposite poles of a powerful electric battery were pressed together and then separated slightly, a blinding flame appeared between them. The cost of operating such a device by means of batteries made its use for lighting buildings or streets impractical. However, an arc light was installed in the lighthouse of Dungeness, on the southern coast of England, in 1862, and was used for a number of years. Not until the invention of the dynamo in 1870 did this method of lighting become practical for commercial purposes.

The most common kind of arc lamp contains two sticks of carbon which touch each other when the current is not flowing. When the current is turned on, an electromagnet draws the upper carbon away a short distance. As the rods begin to separate, the current vaporizes and ionizes some of the carbon. This produces a path across which the current can pass. The gas in the arc and the tips of the carbon rods are raised to the highest

temperature produced by man—known to be above 6300° F., and reported (1935) as about 12,000° F., exceeding the temperature of the sun. If direct current is used, a hollow, or crater, develops in the end of the positive carbon. This crater is the source of the most brilliant light.

For a time, arc lights were employed almost exclusively when electricity was used for street lighting. However, they are more expensive to operate and maintain than tungsten filament bulbs, and have been almost entirely replaced by large incandescent lights (see below). Carbon arc lights now find their greatest use in motion-picture projectors and other kinds of projectors where a very intense source of light must be concentrated in a very small space. Arc lights are also extensively used for producing artificial sunlight for health purposes. The brilliance and the nature of the light which arcs produce are now regulated by placing suitable minerals in the cores of the carbon rods. The extremely high temperature produced in the arc has led to its use in one type of electric furnace (which see).

Incandescent Light. The heart of an incandescent lamp is the *filament*, a conductor of a suitable material, which becomes white hot when connected with the source of current. All such conductors oxidize and become useless when heated in air. To avoid this difficulty, the filament is sealed inside a glass bulb, and the air is pumped out. Wire connectors of platinum or of a nickel-iron alloy, which expand and contract at the same rate as glass, pass through the bulb to the filament. The space inside the bulb may either be left a vacuum, or it may be filled with a gas which does not react chemically with the filament.

The preparation of a suitable filament proved a difficult problem. Thomas A. Edison prepared one of the first successful filaments in 1880; this was made of carbon by heating a bamboo fiber until it was charred. Later, the workers in this field learned to make filaments from threads of cellulose. The cellulose was prepared in a viscous condition and forced out through a small opening, then hardened, and carbonized by heating. Such metals as osmium and tantalum were tried. About 1904 filaments began to be made from the exceedingly resistant metal, tungsten.

The superiority of tungsten filaments was

readily recognized. The melting point of tungsten is extremely high (about 5100°F.) It can be heated until fairly soft before evaporating noticeably. Carbon allows more and more current to flow as the temperature rises, but tungsten allows less current to flow when hot. Thus it is much more economical to keep hot. At first, the tungsten filaments were made by a method which resulted in their being very brittle. Then a method was worked out for getting the tungsten powder into the form of small metallic rods which, when hot, could be drawn through holes in diamonds. By drawing the tungsten through smaller and smaller holes, wires much finer than human hair could be made.

The presence of nitrogen or argon in the bulb of a lamp slows down the evaporation of filaments, which gradually destroys them and blackens the bulb. However, the gas used for this purpose carries away valuable heat. To reduce the loss of heat, most filaments are now wound into tiny spirals, so that each turn is kept hot by its neighbors.

The sealing of the glass tube through which the air had been pumped out left a sharp tip which frequently got cracked off so that air was allowed to enter. To avoid such accidents, a method has been worked out whereby the tip is inside the base of the lamp. Clear glass bulbs produced a glare. Frosting on the outside caught and held dirt, which reduced the efficiency of the light. Now the makers have learned to frost the inside of the bulb by etching it with hydrofluoric acid before the lamp is put together.

To-day we have pear-shaped frosted bulbs whose whole outer surface is smooth. Inside are coiled tungsten filaments, mounted on molybdenum wires and surrounded, in all lamps above the 50-watt size, by argon or nitrogen, or a mixture of the two. Such lamps give one candle-power of light for each half watt of power, whereas the old carbon filaments used more than four watts of power in producing one candle-power of illumination. Manufactured by the millions in automatic machines and sold everywhere, they light our buildings and streets with a brilliance little dreamed of seventy-five years ago.

Luminous Discharge Lamps. The type of lamp which produces light by sending an electrical discharge through a gas is familiar to most of us in the form of the "neon" advertising signs. The common orange-red signs

actually contain the neon gas. Other gases used are argon, krypton, xenon, helium, and mercury vapor. Each has its own characteristic color, and is used either alone or in mixtures to produce the desired effects. Colored glass also aids in producing different color effects.

Luminous tubes of this type were invented during the nineteenth century by Geissler, and called by his name. The French scientist-inventor Georges Claude studied them carefully in recent years, and was largely instrumental in making them successful. To light the tubes, high voltage currents produced by transformers are necessary. Voltages of from 2,000 to 10,000 are commonly used.

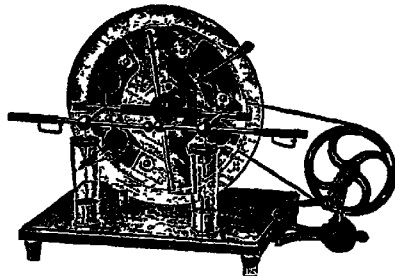
The mercury-vapor arc-lamp belongs in this group. This lamp produces a peculiar bluish light which is especially strong in the colors which affect photographic plates and films. It is, therefore, frequently seen in places where photographic work is done by artificial light. The usual type of mercury-vapor lamp is an evacuated tube in which one of the electrodes is mercury. The flow of current is started through the tube by tilting it until a stream of mercury connects the two ends. When the stream breaks, an arc is formed which heats the mercury and provides the conducting vapor for an arc the full length of the tube.

Lighting Systems. A commercial electric-lighting system consists of a central station where dynamos generate the current (see DYNAMO), the main lines, which conduct the current to the various sections of the territory; and the individual lines, which branch out to the places where the current is used in the lights. Almost all extensive systems now use sixty-cycle alternating current, which is carried through the main lines at voltages up to 330,000 or more and "stepped down" in transformers until, when it reaches the lamps, the electrical pressure is only from 110 to 120 volts.

ELECTRIC LOCOMOTIVE. See Locomotive, subhead *Electric Locomotives*.

ELECTRIC MACHINE, any machine for producing powerful electrical effects. The name is, however, seldom applied to machines depending on magneto-electric principles, but is practically confined to two classes of machines—those which act by friction and those which act by electro-static induction. The former are called *friction machines* and the latter *influence machines*.

For many years the former were the only kind known, but they have now been almost superseded by the latter. In friction machines, the electricity is generated by the friction of either a glass cylinder or a circular glass plate against cushions covered



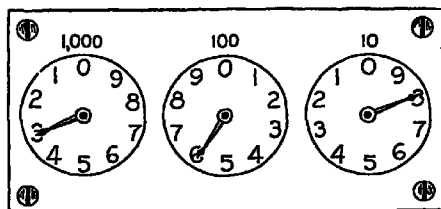
ELECTRIC MACHINE

with an amalgam of zinc and tin. The positive electricity, which is thus developed on the surface of the glass, is given off to an insulated brass conductor, furnished with teeth like those of a comb, the sharp points of which are nearly in contact with the glass. The negative electricity, which is at the same time generated on the cushion, must be provided with some means of escaping, or the action of the machine would soon stop. It is usually allowed to escape to the earth by a brass chain, connected with the cushions; but in some machines a negative conductor, connected with the cushions, is insulated, like the positive conductor, by a glass support. Negative sparks can then be drawn from this conductor at the same time that positive sparks are drawn from the other. Friction machines have been almost entirely replaced by influence machines, and descriptions of these are found in ordinary textbooks on physics.

ELECTRIC METER, an instrument for measuring the amount of electrical energy used by any device or by a consumer. The meter in general use is a sort of electric motor, whose armature carries a current proportional to the voltage supplied and whose field coils are energized by the entire quantity of current (amperes) being used. The rate at which energy is consumed is the product of the voltage and the amperage. Thus, the force turning the motor at any time is proportional to the rate at which energy is used. The armature of the motor revolves horizontally. Its axis is connected with a

system of clockwork which moves an indicator over each of several dials.

The unit of energy supply which is measured by electric meters is the *watt*. A watt is the rate at which energy is used when a current of one ampere is flowing under a pressure of one volt. One watt used for one hour



A SMALL ELECTRIC METER

is one *watt-hour* of electrical energy. The *kilowatt-hour*, one thousand times larger, is used as a more convenient unit. Most meters are thus arranged to give their reading in kilowatt-hours, but are sometimes known as watt-hour meters.

How to Read a Meter. A meter may have three or more dials, one revolution representing 10, 100, 1,000, 10,000, 100,000 or more kilowatt-hours. The pointer at the right of the meter in the illustration moves from the position of zero toward the left, each division of the dial indicating that one kilowatt-hour of energy has been used. The wheels which set the first pointer in motion are connected with the mechanism of the dial next to the left, and turn it in the opposite direction. The connection continues to the other dials, in the same manner. The dials in the illustration indicate a reading of 368 kilowatt-hours.

ELECTRIC MOTOR, a device for driving machinery by means of electric current, that is, for converting electrical energy into mechanical energy. The electric motor is constructed on the same general plan as the dynamo (which see), and a dynamo will run as a motor. The principle on which most motors operate follows: Each wire carrying a current has about itself a magnetic field (see **MAGNETISM**). When such a wire is placed in the field of a permanent magnet or of an electromagnet, it will tend to move in a certain direction with respect to the field. By sending the current through the wires of an armature so that all those on one side tend to move downward through the field of the field magnets, and all the wires on the other side tend to move upward, there will be a strong

tendency for the armature to revolve. Such an effect is accomplished by means of a commutator and its connections, which are similar in all respects to those of the commutator in a dynamo.

While electric motors and dynamos are in principle interchangeable, in practice each machine is constructed for the work it is to perform. Dynamos are usually much larger than motors, and the same dynamo may furnish power for a number of motors, as a dynamo of 100 horse-power may supply power to twenty motors of five horse-power each, or two motors of fifty horse-power each, and each of these may be located far from the others and from the dynamo.

The great advantage in the use of the electric motor is derived from the ease with which electric power can be carried a long distance and distributed with comparatively little loss. In a large factory the placing of electric motors at frequent intervals does away with the long lines of shafting, with their accompanying belts and pulleys, which are necessary when such a motive power as a steam engine or water wheel is employed. The electric motor also makes it possible to utilize water power for generating the current, often hundreds of miles from the place where the motors are located. Because of these advantages electric motors have taken the place of large engines in many factories. Many machines are now constructed with an electric motor attached. In such cases all that is necessary to operate the machine is to turn on the current. By the use of such a device, waste of power is eliminated, as the instant the work is completed the power can be shut off. The electric motor does not require a skilled operator, and with necessary attention to oiling and cleaning, it will usually run for years without repair.

A little thought will show how the electric motor has also transformed conditions in many homes. The sweeper, the washer and wringer, the refrigerator, the sewing machine, the fan, and even the toys are run by motors. In transportation, electric motors drive the street cars, and electrified trains and start the gasoline motors of automobiles and airplanes. The electric motor is thus one of the major ways of making use of the electric current which is now so commonly available.

ELECTRIC RAILWAY, a railway on which electricity is used as the motive power.

It was the invention of the dynamo (which see) that made such railways practicable, but the idea had been discussed many years previously. At an industrial exposition in Berlin in 1879 a circular railway about a thousand feet long was exhibited, showing that the proposition of propelling cars by electricity was not fantastic. The first electric railway in the United States was constructed by Thomas A. Edison at Menlo Park, N. J., in 1880. The track was about ninety rods in length. Three years later Stephen D. Field of California exhibited an electric locomotive at an exposition of railway appliances in Chicago. The first suburban electric line in the United States was constructed from Baltimore to Hampden, Md., and put in operation September 1, 1885. Three years later the street railways of Richmond, Va., were equipped with electric motors, and from that time to the present the expansion of the electric railway has continued, until it is found in all large cities and in many small cities and towns. Indeed, hundreds of electric lines have been constructed between cities and towns distant from one another.

The electrical apparatus of a railway consists of a central station, where a dynamo operated by steam or water power generates the electric current. This is distributed along the line through overhead wires, which are insulated from surrounding objects. On single track roads but one overhead wire is used, except at the switches, where two are always necessary. From the wire the current is drawn by the *trolley*, a small grooved wheel running on the trolley wire and attached to the end of a conducting pole that extends upward from the car. The trolley is connected with the motors, which are attached to the trucks of the car, by wires extending down the side or end of the car. The motor is controlled by a compound switch, or controller, which is operated by the motorman. After it has been used, the current passes into the trucks of the car and from these to the rails, which are connected by copper wire, so that they return the current to the station from which it started.

This is the plan in most general use for distributing power; but another, used on elevated roads and to some extent on lines which own their right of way through the country, is known as the *third rail* system. In this a third rail, either between the rails

of the track or opposite one of them, supported on insulators, carries the current, which is brought in contact with the motor through a shoe that slides over the rail. The third rail is dangerous and cannot be used in places where there is liability that people or animals will come in contact with it. In a few cities, where overhead wires are not permitted, cars receive the current from conductor rails. These are sunk in slots, through which an arm extends from the motors. This is called the *conduit* system.

In 1919 there were over 44,000 miles of electrical railways in the United States. In 1934 there were only about 38,000 miles. This loss has been due to the abandonment of street-railway service in many small cities and of interurban lines which were unable to meet the competition of buses and automobiles. In large cities, electrical surface-car lines, elevated railroads, subways, and suburban trains are still essential factors in community transportation. One of the outstanding suburban systems is that of the Illinois Central at Chicago, which operates some 400 fast trains each day between the "Loop" and the southern suburbs. Steam railroads also make significant use of electric locomotives to supplement the steam equipment where special conditions prevail. Thus, the Pennsylvania Railroad Company has electrified its entire route from Washington, D. C., to New York City. Electric locomotives haul the trains of the New York Central through the tunnels by which they enter New York City, those of the Grand Trunk in the St. Clair tunnel.

The Chicago, Milwaukee, St. Paul & Pacific Railroad has 660 miles of electrified railway in the mountains of western Montana. In this region there is much water power for generating current. A great advantage of the electric locomotives is that in going downhill the motors are operated as generators. This use provides more than thirty per cent of the power used in pulling other trains uphill, and the motors also act as brakes for the descending trains.

ELECTRIC WELDING. See WELDING.

ELECTRO-CHEMISTRY, a branch of science which investigates the relation of electric current to chemical changes. In the various forms of electric cells, chemical changes generate electric current, in electrolysis, on the contrary, electric current produces chemical changes.

Electro-chemistry is of first importance in

the manufacture of a great many chemicals and commercial articles. Lye (sodium hydroxide) and chlorine gas are prepared by passing a current through a solution of common table salt. Copper and zinc are purified and aluminum is reduced from bauxite by electro-chemistry. In some cases, the electric current both heats the material and causes the changes to occur. The most common applications of this science are seen in electric cells and storage batteries, and in electroplating and electrotyping. See **ELECTRIC BATTERY**; **ELECTROLYSIS**; **ELECTROPLATING**; **ELECTROTYPING**.

ELECTROCUTION, *e lek tro ku'shun*, a method of inflicting the death penalty by electricity, as punishment for first-degree murder. The person to suffer death by this means is strapped to a chair; one electrode is fastened to the top of his head, the other to an ankle. A current of about 2,000 volts is then applied, and it passes through the body. This method is used exclusively in criminal executions in several states of the United States, having been adopted on the recommendation of a board of investigators, for the reason that it is more humane than hanging. See **CAPITAL PUNISHMENT**.

ELECTRODE, the term used to denote the terminals by which electricity enters or leaves a body upon which it acts. They are the same as *poles*. The positive electrode is known as the *anode*, and the negative is called the *cathode*. These terms were originally introduced by Faraday and were used only in connection with electrolysis, but they are now in general use wherever electricity is applied.

ELECTROLYSIS, the chemical decomposition of compounds by the action of a current of electricity. Acids, bases, and salts are composed of tiny particles called ions, which possess electrical charges. Each portion of compound contains equivalent amounts of positive and negative ions. When such compounds are dissolved in water, some of the charged particles are freed from each other, or *dissociate*, and the solution becomes a conductor. The same is true if compounds of this type are melted. These compounds and their solutions are both known as *electrolytes*. When electrodes are connected with a source of direct current and lowered into a molten or dissolved electrolyte, the positive ions migrate toward the negative

plate, are there discharged by receiving electrons from the plate and change into a new substance, often an element.

Similar changes take place at the positive pole. For example, if current be passed into a solution of copper chloride through two carbon electrodes, the copper chloride gradually disappears from the solution, while metallic copper is deposited on the negative plate and bubbles of chlorine rise from the positive plate. Water may be separated into its elements by making it a conductor with a little sulphuric acid. Hydrogen appears at the negative plate and oxygen at the positive plate, the volume of hydrogen being twice that of the oxygen. Molten sodium hydroxide is electrolyzed in an iron vessel to obtain the element sodium. Aluminum is obtained by electrolyzing an aluminum ore called bauxite while dissolved in molten cryolite, another mineral.

The destructive phases of electrolysis are also of importance. Chemicals freed on the surface of an electrode may corrode the electrode by entering into chemical combination with it. Thus the currents which pass through the ground from trolley lines to power-houses tend to cause the corrosion of iron, gas, water, and sewage pipes at points where they act as positive electrodes. The pipes frequently break at weakened points. The remedy lies in providing easier return paths for all electric currents.

ELECTRO-MAGNET, a piece of iron temporarily converted into a magnet by means of a current of electricity sent through a wire coiled round the iron. The wire is usually covered with silk, cotton, rubber, or some other insulator, to prevent the current from leaping across and to compel it to travel through the whole length of the wire. The more pure and soft the iron is, the stronger will its magnetism be while it lasts, and the more completely will it disappear when the current stops. Steel is less affected than soft iron for the time, but remains permanently magnetized after the current ceases. The iron which is magnetized by the current passing round it is called the *core*. It is frequently straight, the wire being wound upon it like thread upon a reel; but very frequently it has the shape of a U, or horseshoe, the wire being coiled round the two ends and the bend of the U left uncovered.

An electro-magnet is said to be *made* when the current is sent through its coil, and *un-*

made when the current is stopped. In some applications of electro-magnets it is necessary to make and unmake them in rapid succession. It is then preferable for the core to consist of a bundle of iron wires, rather than of a solid bar.

Electro-magnets have two advantages over permanent magnets. Their magnetism is easily controlled by controlling the electric current used to make them, and they can be made much stronger than can permanent magnets.

Electro-magnets are possible because of the fact that every electric current exerts a magnetic influence in its neighborhood (see ELECTRO-MAGNETISM). When a wire carrying a current is wound into a coil, the strength of the magnetic influence about the whole coil increases in proportion to the number of turns. An easily magnetized core placed within the coil increases the magnetic force still more. The strength of an electro-magnet is thus increased by the addition of more turns of wire to its coils and by sending a larger current (more amperes) through it.

To predict which end of an electro-magnet will be the north pole, the following rule may be employed: Grasp the coil with the right hand in such a way that the fingers point in the direction the current is flowing about the coil (from positive to negative), and the outstretched thumb lies along the magnet. The thumb then points to the north pole of the magnet.

Electro-magnets are important parts of many of our commonest electrical devices. They create the magnetic fields of dynamos and motors, operate electrical bells and telegraph sounders. A telephone receiver is really a combined permanent magnet and electro-magnet. In iron and steel manufacturing plants great magnets, supported on elevated tracks, are able to pick up and carry from one part of a building to another masses of iron weighing several tons. See DYNAMO; TELEGRAPH; TELEPHONE.

ELECTRO-MAGNETIC THEORY OF LIGHT, the theory that light is a form of electro-magnetic radiation similar to the radio or Hertzian waves which are sent out by oscillating currents of electricity. The theory is generally accepted by scientists. Cosmic rays, X-rays, ultra-violet rays, visible light, infra-red rays, and radio waves are classified together and differ only in wave length. The

different types of radiation listed are in order from the shortest to the longest wave length. The electro-magnetic theory is one of the great unifying theories of physics, combining under one point of view all the different kinds of radiation and connecting them with the theory that all matter is made of electricity. See ELECTRICITY, subhead *The Electron Theory*.

ELECTRO-MAGNETISM, a term that in its broadest sense denotes the science which treats of the relation between magnetism and electricity. In a narrower sense, a magnetic effect produced by electricity is said to be *electro-magnetic*.

The simplest experiment to illustrate this action is to take an ordinary surveyor's compass, hold just above it a copper wire parallel to the needle of the compass and then, while the wire is in this position, let its two ends be connected with the two poles of an electric battery. The needle will instantly turn away from its north and south position and will remain deflected as long as the current continues to pass over it. If the current flows from south to north, the north end of the needle is turned to the west, if the current is in the opposite direction, the needle turns to the east. This is the easiest test for determining the direction in which a current is flowing through a wire; and it is the basis of the construction of one kind of galvanometer, the instruments employed for the measurement of currents (see GALVANOMETER). The current tends to make the needle take a position at right angles to the direction of the current; but as the earth tends to make the needle point north and south, the position actually taken is between the two. The fact that a current deflects a needle was discovered by Oersted of Copenhagen, in 1819.

When a magnet is moved in the neighborhood of a wire or other conductor, the motion induces a current of electricity in the conductor; and a similar effect occurs if the wire is moved while the magnet remains at rest. In the experiment above described, of making a magnetic needle turn on its pivot by sending a current through a wire held above it, the motion of the needle produces for the time being a weakening of the current. If the needle were made by mechanical means to turn the contrary way, it would strengthen the current for the time being. If there were no original current, the turning of the needle to either side by mechanical

means would produce a current in the wire. The current thus produced is always opposite in direction to that which would aid the motion. The principles of electro-magnetism are employed in the construction of electric motors.

ELECTROMETER, an instrument used to measure the difference of potential between two conductors. Most of the electrometers in use are inventions of Sir William Thomson, who was the first to give accuracy to this branch of electrical measurement. His quadrant-electrometer is the one most used. As it is employed only in laboratory work, it is of little interest to the general public.

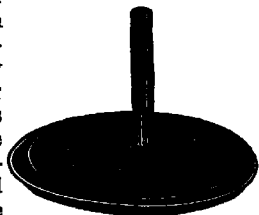
ELECTRO-MOTIVE FORCE, a phrase, commonly abbreviated into the three letters *e. m. f.*, is the force which tends to cause a flow of electricity. The electro-motive force in a wire through which a current is flowing may be compared to the difference of pressures in a long, narrow horizontal pipe, through which water is flowing. As the difference of the pressure at the two ends of the pipe forces the water through, in spite of frictional resistance, so the difference of the potentials at the two ends of the wire forces the current through, in spite of the electrical resistance of the wire. This difference of potentials is another name for electro-motive force.

The commercial unit of electro-motive force is the *volt*. Its magnitude may be inferred from the statement that the electro-motive force of a single cell of an electric battery is usually more than one volt and less than two and one-half volts. The electro-motive force of the ordinary circuit for electric lighting for homes is from 110 to 120 volts. It is no unusual thing for a dynamo to give an electro-motive force of 1,000 or 2,000 volts. The number of volts required to kill a man by electrocution varies from 1,200 to 2,500 volts.

ELECTRON. See **ELECTRICITY**, subhead *The Electron Theory*.

ELECTROPHORUS, *e lek' trof'* or *us*, a simple device for producing static electrical charges by induction. It consists of a flat plate of hard rubber, sealing wax, or similar material which is readily electrified by friction, and a metallic disc to which is attached a handle of glass or hard rubber. To operate the device, the non-metallic plate is rubbed with a woollen cloth or cat fur. The plate thus becomes negatively charged. The me-

tallic plate is then placed on the non-metallic plate. Induction draws a positive charge to the bottom of the plate and repels a negative charge to the top from which it is released by touching the metallic plate with the finger for an instant. Upon lifting the metallic plate by the insulating handle it is found to be charged positively so that it will produce a visible spark when



ELECTROPHORUS

brought near a conductor. Charging of the metallic plate may be accomplished repeatedly without further charging of the non-metal. The Leyden jar (which see) may be used to accumulate the small charges from the electrophorus to produce a much brighter spark than the plate of the electrophorus alone will give.

ELECTROPLATING, *e lek' tro playt' ing*, the process by which a thin but solid and durable deposit or plating of gold, silver, nickel, or any other metal is put on a cheaper metal by means of an electric current.

The article to be plated is placed in a solution, the *electrolyte*, which contains the plating metal as the positive ions of a compound (see **ELECTROLYSIS**). For instance, silver cyanide is silver compound commonly used for silver plating. The article is connected with the negative pole of a battery or generator and the positive pole is connected to a plate of the metal to be deposited. When the current is turned on, the positively charged particles are attracted to the article, discharged, and left on the surface as a plating of metal. An equal amount of the metal leaves the positive pole and enters the solution, thus maintaining its concentration. The thickness of the plate will depend on the length of time the plating current is allowed to act.

A medal is made by casting or stamping the object from some cheap metal and plating it as described above. Silverware, watch cases, rings and many other articles are electroplated. One of the most useful examples of electroplating is called *electrotyping*, by which pages of type faces and engravings are reproduced in thin copper shells, these are filled with type metal and mounted on bases for printing. See **ELECTROTYPING**.

ELECTROSCOPE, *elektro skope*, an instrument for ascertaining the presence and nature of a charge of electricity. When a strip of gold leaf, folded in the middle, is suspended in a bottle or a jar by a wire that can be connected with the electrified body, an electroscope is formed. A more simple electroscope, but one less sensitive, is made by attaching a pith ball to a silk thread and suspending it from a glass support. When an object charged with positive electricity is brought near the ball it will be attracted to the object, become charged with positive electricity, and then be repelled, in accordance with the law that like charges repel each other. See **ELECTRICITY**.

ELECTROTHERAPY, the treatment of disease by means of electrical appliances. The principal methods employed are the following.

1. *Galvanism*, or the application of a battery current directly to the body. Such a current acts by electrolysis on the fluids of the body. Oxygen collects at the positive pole, forming acid compounds which tend to harden the tissues and reduce inflammation. Alkali compounds form at the negative pole, increasing the flow of blood to the part and producing greater sensitiveness. Thus the positive and negative poles produce opposite effects.

2. *Faradism*, or the application of a current from the secondary winding of an induction coil. Such a current acts as a sedative.

3. The *sinusoidal current*, a form of alternating current of low frequency.

4. *High frequency currents*. Blood pressure may be reduced or increased by high frequency currents. The d'Arsonval current reduces blood pressure. The current is relatively high, and the alterations are extremely rapid, but the voltage or pressure is low. The Tesla current produced at high voltage and high frequency but with relatively low current strength increases blood pressure. One form of Tesla current can be used to heat the interior of the body without appreciably heating the surface. This method of treatment is called "diathermy," which means heating through. In treatment with high frequency currents a vacuum electrode is used to explore the electric field about the patient. The tube glows with a violet light when placed in the electric field.

ELECTROTYPING, the process of mak-

ing a metallic cast of type or an engraving by electricity. The form of type or woodcut is cleansed and dusted with finely powdered graphite. It is then laid face upward on a powerful press, a sheet of beeswax upon a lead plate is placed on top of the form and an impression is taken in the press. The wax mold so formed is coated with powdered graphite to make it a conductor of electricity. After the loose particles of lead are blown off, the wax mold is washed with a weak solution of sulphate of copper, then it is dusted with iron filings. It is then suspended in a bath consisting of two parts of sulphate of copper and one part of sulphuric acid diluted somewhat in water. The wax plate is then connected with the negative pole of a battery, and a sheet of copper is hung in front of the wax and connected with the positive pole. The current is then turned on, copper from the solution is deposited on the wax mold, and more copper is dissolved from the plate (see **ELECTROLYSIS**). After several hours the mold is removed from the bath, and the shell of copper is taken from the wax. It is then *backed up* with lead or type metal and planed smooth, when cold, the edges are then finished and the plate is ready for the press. The plate, when complete, is about one-eighth of an inch thick. It is then placed on a block or a frame to make it the same height as the type. Electrotypes are used in book and magazine printing and in the reproduction of engravings and halftones. These books are printed from electrotypes.

A well-made electrotpe has been known to remain in fair condition after a single run of 300,000 impressions on the printing press. When small editions of books are run and electrotypes must therefore be handled frequently in reprintings, an electrotpe will usually be in poor condition after 125,000 or 130,000 impressions. See **HALFTONE, PRINTING**.

ELEGY, *el'egj*, in its widest sense, a serious poem with a melancholy tone. In English poetry the elegy is a lament over the death of a loved one, as Shelley's *Adonais*, or a poem inspired by thoughts of death, as Gray's *Elegy Written in a Country Churchyard*. The pastoral elegy, such as Milton's *Lycidas*, is so called from its rural setting.

ELEMENTS. See **CHEMISTRY**, subhead *Chemical Elements*.



ELEPHANT, *el'fant*, the largest living land animal, comprising two species, the African and the Asiatic. The African elephant is the larger, stronger and more ferocious of the two, its hide is tougher and its ears larger, its head is less elevated. Its back slopes downward from shoulders to rump. Its trunk is longer and drags on the ground, even when the end of it is curled. Both

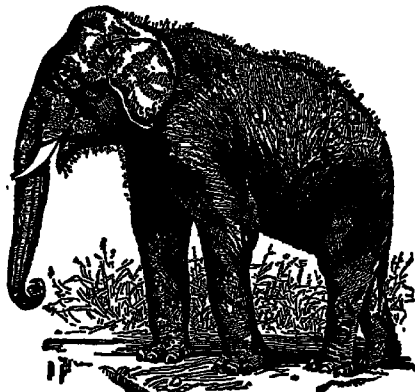
sexes have tusks. The Asiatic, or Indian, elephant, as it is often called, is smaller. Its back is decidedly rounding, and only the males bear tusks. It is thus elephant which is seen at circuses, for unlike the African elephant, it is tame in captivity.

Sometimes elephants attain the height of fifteen feet, but usually a mature animal is from nine to ten feet high and weighs from 4,000 to 10,000 pounds. The body is very bulky, the legs are enormously large and almost straight and the short toes are covered by hooflike nails. The skin of the elephant is very thick and coarse, and it bears only here and there a few scattered hairs.

The most remarkable feature of the elephant is its long trunk, an extension of the nose. It has two tubes extending to the tip. This tip is exceedingly sensitive, and in one species it is furnished with two small projections; one, which somewhat resembles a finger, extends from the upper surface, the other projects from the lower side. By means of it the animal can pick up very small objects. The trunk is provided with very strong muscles and is useful in procuring food and for defense. With his trunk the elephant picks up and puts into his mouth all his food and water; with it makes a loud trumpeting noise, his signal of alarm or anger.

The cutting teeth on each side of the upper jaw develop into long tusks, useful to the animal in a natural state both for grubbing food and for defending itself against attack. In some well-grown males each tusk weighs as much as 200 pounds. Although the head of the elephant is enormously large, and its forehead broad, yet its brain is small. However, this does not show any lack of intelligence, for no animal, with the possible

exception of the horse and dog, can be taught to do more things requiring intelligence than the elephant.



AFRICAN ELEPHANT

Elephants live in herds of considerable size, but the old males sometimes leave the herds or are driven from them, and thereafter live solitary lives. They usually become vicious and exceedingly destructive sometimes demolishing native crops. Such elephants are commonly called rogues. The wild animals are caught in various ways. Sometimes pits are dug, into which the animals fall; or, a strong enclosure is built, into which the elephants are driven by fire, gun shots or other loud noises. In some localities trained elephants are sent out into the forests to make the acquaintance of wild ones and lead them into captivity. Two tame elephants can keep a single wild one so interested that the hunters are able to come up and put heavy chains about its legs and tie it to a tree, where it is held during the furious anger which follows its capture. After a long and tedious struggle, the captured elephant is subdued and then becomes tame and submissive.

Elephants have been known since very early times. The earliest records in history tell us that they were trained by man to do various things even to take part in war. Hannibal had with him an army of elephants when he invaded Italy; their numbers inspired terror for a time.

The animals have been used to a greater extent in India than in any other country. There they have been for centuries a chief means of conveyance, carrying passengers in commodious canopied seats on their backs.

Two or more persons may occupy this seat; the driver sits on the animal's neck. Elephants can be taught to do numerous kinds of work, to lift great weights and to carry heavy loads

Many elephants are held in captivity, altogether for show purposes. There is hardly a zoological garden in existence that does not have one or more of these animals. They are always great favorites with the children and learn to expect food and little attentions from every child that comes their way. Some of the herds that are exhibited by circuses and traveling shows are trained to do remarkable tricks.

ELEPHANTIASIS, *elephantiasis*, a disease prevalent in the East Indies and other warm countries. One attack of the disease is followed by others, and after each attack some part of the body, usually the leg, becomes larger and larger, till it grows to enormous size. The disease is sometimes called *Barbados leg*; the more common name refers to the fact that the skin of a victim becomes rough, something like an elephant's hide. Attacks are brought on by a tiny worm which works under the skin. It is thought to be transmitted by the mosquito.

ELEPHANT SEAL, the largest of the seal family. There are probably two species, one found only on the coast of California and western Mexico, the other in Patagonia, Heard's Island and some waters of the southern hemisphere. The animals vary in length from twelve to thirty feet, and are about twelve feet in circumference. They have heavy tusks, prominent eyes and eyebrows and an elongated nose, or snout. Both species are hunted and are consequently becoming very rare. See **SEAL**.

ELEUSINIAN, *elusinæan*, **MYSTERIES**, the sacred rites observed in ancient Greece at the annual festival of December, or Ceres, so named from their original seat, Eleusis. They constituted a kind of miracle play, which represented the scenes Demeter passed through in searching for her daughter Persephone. The candidates for the acting rôles were expected to walk from Athens to the sea for purification in the salt water; to fast a day, to offer sacrifices, and to rehearse in processions. On the ninth day of their initiation they were conducted to the lighted shrine in the temple, where the mysteries were revealed to them. As a preparation for the greater mysteries celebrated at Athens

and Eleusis, lesser Eleusinia were celebrated at Agræ, on the Ilissus.

ELEVATED RAILWAY, a railway built upon framework above the level of the street. New York, Boston, Philadelphia, and Chicago are the only cities in the United States having elevated roads; these also serve their suburbs. A framework of steel is used, supported by steel pillars. Between these are stretched cross beams, upon which plate girders are laid. The entire structure is thoroughly braced. Ties are laid on the top of the girders, and to these the rails are spiked. The stations are erected on elevated platforms, of the same height as the track, and are reached by stairways or elevators. In Boston and New York the elevated roads connect with subway lines. The first elevated railway in America was built in New York City in 1867. Berlin, Paris and Liverpool are European cities with elevated railways. At first steam was used for the motive power, but that has been everywhere entirely replaced by electricity. On a few of the German elevated railroads the cars are suspended beneath the girders. These lines are known as *suspended railways*, or *monorails*.

ELEVATOR, a mechanical contrivance for hoisting loads from one level to another. That used for carrying grain or coal out of ships, or for similar purposes, consists of a series of boxes, or buckets, attached to a belt traveling round two drums, placed one above the other. The elevator used for raising loads from one story of a building to another consists of a movable cage, balanced with weights and operated by water or electric power. The development of this kind of elevator was epoch-making in its effects upon architecture, making possible the modern skyscraper. A *grain elevator* is a large building for storing grain. See **GRAIN ELEVATOR**.

ELGAR, **EDWARD WILLIAM**, SIR, (1857-1934), one of the great modern British composers, born at Broadheath, near Worcester. He was thoroughly educated in music and specialized on the violin and organ. In 1882 he became conductor of the Worcester Instrumental Society, and three years later was organist at Saint George's Church. He resigned this post in 1889 and began to devote himself to composition. He was knighted in 1904 and the following year became professor of music in the University of Birmingham, where he remained until 1908. Elgar's compositions include works in all

forms, including operas, symphonies, oratorios and concertos. His *Dream of Gerontius*, an oratorio, is among the few inspired large works of English composers.

ELGIN, el'jin, ILL., in Kane County, thirty-seven miles northwest of Chicago, on the Fox River, and Chicago & North Western and Chicago, Milwaukee, Saint Paul & Pacific railroads, and the Chicago, Elgin & Aurora electric line. There is an airport. It is in an agricultural region, and dairying is particularly important. Elgin butter is quoted on all produce exchanges. An important religious publishing house is located here. The manufactures includes silverplate, condensed milk, shoes, flour and machinery; the famous Elgin watches are made here, and there is also an important watch-case factory, one of the largest in the United States. The educational institutions are the Elgin Academy, a Roman Catholic Seminary and a manual training school; the city also contains the Northern Illinois Hospital for the Insane and Gail Borden Public Library. Elgin was settled in 1835 and was chartered as a city in 1854. Population, 1920, 27,431; in 1930, 35,929.

ELGIN, JAMES BRUCE, Eighth Earl of (1811-1863), English statesman, son-in-law of the Earl of Durham, was educated at Eton and at Christ Church, Oxford. After four years as governor of Jamaica he was appointed Governor-General of Canada in 1846, while the struggle for responsible government was at its height. Though the principle had been acknowledged by



EARL OF ELGIN

Lord Sydenham in 1841, it was not until Lord Elgin summoned Lafontaine and Baldwin to form a new Ministry after the general election of 1848 that the principle was really in operation. Since that date no Canadian governor has ever denied either the principle or practice of responsible government. His frankness and his genial manners were of great aid to him in his efforts toward reform, and long before his term of service was over he was described as the most popular man in Canada. Lord Elgin returned to England in 1854, and in 1862 became Viceroy of India.

ELGIN, el'gin, MARBLES, one of the world's most famous collections of sculptures, all obtained from Athens. They comprise fifty-six slabs from the celebrated frieze of the Parthenon (which see), the principal figures from the pediments of that structure, and fifteen from its metopes, besides a Caryatid (see CARYATIDES) from the Erechtheum, a portion of the frieze of the temple of Athene Nike, and various inscriptions and fragments. This priceless collection represents a year of labor on the part of the seventh Earl of Elgin (1768-1841), who secured them in 1801, while he was serving as ambassador to Turkey. In 1816 they were purchased from him by the British government for \$175,000, and placed in the British Museum. The removal of the sculptures was denounced by some as an act of robbery, but time has justified the deed, for art works which were left in Athens were seriously injured by the Turks.

ELI, one of the Hebrew judges, the predecessor of Samuel. He was high priest and judge for forty years. The story of Eli is told in these volumes in the article **BIBLE**, subhead *Bible Stories*.

ELIJAH, the most distinguished of the prophets of Israel, flourished in the ninth century B. C., during the reigns of Ahab and Ahaziah (*I Kings*, XVII-II *Kings*, I). His special work seemed to be to pronounce vengeance on the kings of Israel for their apostasy. Elijah ascended to heaven in a chariot of fire, in the presence of Elisha, his successor. See **BIBLE**, subhead *Bible Stories*, for details of Elijah's career.

ELIOT, CHARLES WILLIAM (1834-1926), one of the most honored of American edu-

cators, was born in Boston. He was educated at Harvard College, and upon graduation was appointed tutor of mathematics in that institution. Later he became assistant in mathematics and chemistry there. After spending seven years teaching at Harvard, he went abroad to study the educational systems and methods of European countries. On his return he was appointed professor of analytical chemistry in the Massachusetts Institute of Technology.



In 1869 he was chosen president of Harvard University. Under his administration the work of the university was completely re-organized and its scope greatly broadened. He retired in 1909. Doctor Eliot is recognized as one of the leading authorities on higher education in the United States, and he is widely known as a speaker and writer on educational subjects. He is the author of *Compendious Manual of Qualitative Chemical Analysis*, *The Working of the American Democracy*, *American Contributions to Civilization and Other Essays*, *University Administration* and of many essays and addresses. Late in his career he chose the texts for a standard library, which were published as the "Five-foot shelf of books," or "The Harvard Classics." See HARVARD UNIVERSITY.

ELIOT, GEORGE (1819-1880), the pen name of Mary Ann (or, as she preferred to write the name in later years, Marian) Evans, one of the greatest of English novelists. She was the daughter of a Warwickshire land agent and surveyor and was born at Arbury. She received an excellent education and, although obliged by her mother's death to take charge of the home at sixteen, she managed to keep up her studies, so that by the age of twenty-one she had a large, if decidedly unsystematic, fund of knowledge. The removal of her family to



GEORGE ELIOT

Coventry in 1840 led to her acquaintance with a number of freethinkers, under whose influence she became an agnostic. Her first literary work was a translation of Strauss's *Life of Christ*, published in 1846.

In 1849, on the death of her father, she went to the Continent and spent some months at Geneva. On her return to England she became assistant editor of the *Westminster Review*, a position which was of great importance to her, because it led to acquaintance with many of the foremost men of the day. Among these was one who was destined to have most influence on her life, George Henry Lewes. Miss Evans and Lewes could not marry, as Lewes had a wife still living, from whom he could not secure

a divorce; but they both regarded their union, which lasted until the death of Lewes, as possessed of all the force of a legal marriage. It was through the influence of Lewes that George Eliot made her first attempt at fiction, *The Sad Fortunes of the Reverend Amos Barton*, which appeared in *Blackwood's Magazine* in 1857. This was followed by Mr. Gilfil's *Love Story* and *Janet's Repentance*, and these were afterwards republished as *Scenes of Clerical Life*. The stories were enthusiastically received, and the praise of the unknown writer was increased on the publication of *Adam Bede*, *The Mill on the Floss*, with its portrayal, in Maggie Tulliver, of George Eliot's own youthful personality, and *Silas Marner* followed, and then she turned from her pictures of middle class English farm life to prepare for the writing of a historical novel, the scene of which should be laid in Italy. The result was *Romola*, her most ambitious, if not in all ways her most successful, work. In her remaining novels, *Felix Holt*, *Middlemarch* and *Daniel Deronda*, her scenes are again laid in England. A long poem, *The Spanish Gypsy*, added little to the fame of its author. Mr. Lewes died in 1878, and George Eliot, although her grief was extreme, was married in 1880 to John Walter Cross. She lived only six months after her marriage.

ELIOT, JOHN (1604-1690), "the apostle to the Indians," was born in England and graduated at Cambridge University. In 1631 he removed to Boston and the following year connected himself with a church at Roxbury, Mass., and kept up the connection until a short time before his death. He learned the language of the Indians and devoted himself to improving their condition. He translated the Bible into the Indian tongue, published an Indian grammar and with others made the *Bay Psalm Book*, an English metrical version of the Psalms, the first book printed in New England. At South Natick and at Newton are monuments to Eliot's memory.

ELI'SHA, a Hebrew prophet, the disciple and successor of Elijah (*II Kings*, II, 9, XIII, 21). Many miracles of prediction and cure, and even of raising the dead, are ascribed to him, but his figure is less original and heroic than that of his master. He held the office of prophet for fully sixty-five years, from the reign of Ahaziah to that of Joash.

ELIXIR, a word of Arabic origin, applied to a number of solutions employed by alchemists in an attempt to change base metals into gold; also, a potion, the *elixir vitae*, or elixir of life, supposed to confer immortality. Elixir is still used as a name for various patent medicines.

ELIZABETH, (1533-1603), queen of England, daughter of Henry VIII and Anne Boleyn, was born at Greenwich and was almost immediately declared heiress to the crown. After her mother was beheaded (1536), Elizabeth

was declared illegitimate, but she was finally placed after Edward and Mary in the order of succession. At the death of Edward, Elizabeth vigorously supported the title of Mary against the pretensions of Lady Jane Grey, but nevertheless continued throughout Mary's reign to be an object of suspicion.



QUEEN ELIZABETH

In self-defense she made every demonstration of zealous adherence to the Roman Catholic faith, but her motives were well known. In 1558 Mary's reign came to a close, and Elizabeth was immediately recognized as queen by Parliament. Following the bloody reign of Mary, stained with religious persecutions, naturally the first great object of Elizabeth's reign was to settle the religious question. She called Parliament on January 25. The nation was prepared for a return to the reformed faith, and the ecclesiastical system devised in her father's reign was reestablished, the royal supremacy was reasserted and the revised prayer book was enforced by the Act of Uniformity. Elizabeth's first Parliament approached her on a subject which, next to religion, was the chief vexation of her reign—the succession to the crown. They requested her to marry, but she declared she would never marry.

For the most part Elizabeth and her ministers were on the side of peace, and they undertook no wars which were not absolutely necessary. Some support was given to the Huguenot party in France and to the Protestants in the Netherlands, so that throughout Europe Elizabeth was looked on as the

head of the Protestant party. But her parsimony was too great ever to allow her to furnish substantial aid. Many of the political events of the reign were connected with Mary Queen of Scots (See MARY STUART). The detention of Mary in England, whither she fled to the protection of Elizabeth, led to a series of conspiracies, beginning with that under the earls of Northumberland and Westmoreland and ending with the plot of Babington, which finally determined Elizabeth to make away with her captive. The state of France, consequent on the accession of Henry IV, who had been assisted by Elizabeth, obviated any danger from the indignation which the deed caused in that country; and the awe in which King James stood of Elizabeth, and his dread of interfering with his own right of succession to England, made him powerless. But Philip II of Spain was not to be appeased. The execution of Mary lent edge to other grievances, and he refused to be satisfied with the sacrifice Elizabeth seemed prepared to make of her Dutch allies. He dispatched against England the great Armada, which furnished occasion for a tremendous English victory, redounding to the glory of Elizabeth and her ministers (See ARMADA).

In her choice of advisers Elizabeth showed remarkable sagacity, and her government at home and abroad was sustained by such men as Burleigh, Bacon and Walsingham. In her choice of personal favorites, notably Dudley, Earl of Leicester, and the Earl of Essex, she was not so fortunate. Elizabeth's reign was one of the most brilliant in history. Not only in the department of state, but in all ranks, were men of more than local or periodic eminence, among them Spenser, Shakespeare and Bacon. It was in Elizabeth's day that the East India Company was founded, and the way thus paved for the beginning of England's colonial empire.

ELIZABETH, N. J., the county seat of Union County, on Staten Island Sound, four miles southeast of Newark and twelve miles southwest of New York City, on the New Jersey Central, the Pennsylvania, the Lehigh Valley, the Reading and the Baltimore & Ohio railroads. Four long distance bus lines serve the city. It is the center of a network of radial and loop highways, including the Lincoln and the William Penn highways. Airplane service on regular schedule connects with all points east, west and south. It is an

important suburb of New York. The 240 industries yield some 400 products including dry ice, aviation signals, clothing, chemicals, printing presses, vacuum cleaners, and fire-resisting lumber

The town was first settled in 1609 by Dutch and English in the employ of the East India Company, it was incorporated in 1855. Population in 1930, 114,589, a gain of 20 per cent in ten years.

ELIZABETH CITY, N. C., the county seat of Pasquotank County, 46 miles south of Norfolk, Va. It is in an agricultural, lumbering and cotton region, it has a good harbor and a considerable trade. Population, 1930, 10,307.

ELK, a name applied to two members of the deer family, found respectively in the European and North American continents. Both species have been hunted until their numbers have been greatly reduced.

American Elk, or Wapiti (Indian name) This noble game animal once ranged over the continent from the Carolinas to Alaska, but it is now seen only in the Rocky

The American elk is a close relative of the European red deer, but is much larger, standing five feet high at the shoulder, and weighing as much as 1,000 pounds. Its upper parts are yellowish-brown, and its sides are gray, there is a whitish patch on each buttock, and the red and black neck has a thick growth of coarse black hair. The animal has a magnificent pair of branching antlers, which curve outward and backward, but have the tines pointing forward. Grasses, weed and leaves form the wapiti's food.

European Elk. This, the largest deer of Europe, is very similar to the moose of the United States. It stands about six feet in height at the shoulders, has a thick, large, clumsy head and broad, flat horns. It is grayish-brown in color, some parts being lighter than others. It is still found in many of the wilder parts of Europe, as it is rigidly protected by law. It is easily tamed and has been used as a beast of burden in Sweden.

The Irish elk was a large animal which is now extinct. It was distinguished by its enormous antlers, the tips of which were sometimes as much as eleven feet apart. Its remains are found not only in Ireland but in Scotland and England and on the Continent.

ELKHART, IND., in Elkhart County, 100 miles east of Chicago, at the junction of the Saint Joseph and the Elkhart rivers and on the Cleveland, Cincinnati, Chicago & Saint Louis, and New York Central Lines. A \$15,000,000 superpower plant serves most of the 88 manufacturing plants of the city. They produce aviation and automobile equipment, musical instruments, castings, power presses and pumps, tools, steamship supplies and many other commodities. The Carnegie library contains over 45,000 volumes. There are 16 school buildings and about 40 churches. Population in 1930, 32,949, a gain of 35.7 per cent in ten years.

ELKS, BENEVOLENT AND PROTECTIVE ORDER OF, a fraternal society organized in New York City in 1868. In 1871 the Grand Lodge was incorporated, and the past officers of New York Lodge No. 1 were made its charter members. The Grand Lodge was empowered to form subordinate lodges, and since then organizations to the number of over 1,500 have been established in various cities of the United States and in its outlying possessions. White male citizens of the United States



AMERICAN ELK, OR WAPITI

Mountains from the Northern United States into Alberta. It has been hunted for its flesh, hide, teeth and antlers, especially by the Indians. They covered their teepees and lodges with the wapiti's skin, and used the flesh for food. Later, after the whites gained possession of the West, large numbers of the animals were slaughtered for their teeth, which were used by the Elks' fraternal order as membership badges. Game laws are now in force to protect surviving wapiti, and the membership badges of the order are an imitation elk's head.

twenty-one years of age and above are eligible to become members. Relief is extended to members of the order, and to sufferers in such disasters as the California earthquake. The average annual expenditure for charitable purposes is over \$2,000,000. An annual memorial service for the deceased members is held on the first Sunday in December. The official organ is *The Elks Magazine*, issued monthly at 50 East 42nd Street, New York. A home for indigent members is maintained at Bedford, Virginia. A national memorial to the more than 70,000 members who served in the World War has been erected in the city of Chicago.

ELLESMERE, *el'smeer*, **LAND**, the name given to a part of Arctic America. It is separated from Greenland by Smith Sound and is south of Arthur and Grinnell Lands. Snow and ice are perpetual over almost the entire tract.

ELLIOTT, MAXINE (1871-), an American actress, born at Rockland, Maine. She accomplished her first stage success at the age of nineteen, with E. S. Willard in *The Middleman*. In 1895 she went with Daly's company to London, where she played in light comedy and in Shakespearean parts. Later she joined Nat C. Goodwin, to whom she was married in 1898 and from whom she was later divorced. Plays in which she appeared with more than ordinary success are *The Professor's Love Story*, *Nathan Hale*, *When We Were Twenty-One*, *Her Own Way*, *Her Great Match*, and *Myself—Bettina*. In 1903, she became owner and manager of the Maxine Elliott Theatre, New York City. She was noted for her spirited acting and her great beauty.

ELLIPSE, a figure in geometry ranking next in importance to the circle, produced when a cone is cut by a plane passing through it neither parallel to, nor cutting, the base. It may also be defined as the path of a point moving in a plane in such a way that the sum of its distances from two fixed points, called the *foci* (each, a *focus*), is equal to the elliptical path. The area of an ellipse is πab , in which a is half its length, b half its width, and π , about 3.14159. Kepler discovered that the paths described by the planets in their revolutions round the sun are ellipses, the sun being one of the foci.

ELLIS ISLAND, an immigration receiving station of the United States government. The island is situated in New York Harbor,

a mile southwest of Manhattan. All immigrants who enter America by way of the port of New York are detained at Ellis Island, and there are examined as to their physical, mental and moral condition. Those who pass the tests are then landed at the foot of Manhattan Island to face their fortunes in a new world.

ELLSWORTH, LINCOLN (1880-), explorer in the cold wastes of both poles of the earth, was born in Chicago, the son of James W. Ellsworth, prominent industrialist. He was educated in civil engineering at Columbia University, and for some time followed that profession. After the death of his father in 1926, Ellsworth drew upon his rich inheritance to gratify his ambition in the field of exploration. He was one of the Amundsen party that flew over the North Pole in 1926; he thrice explored the Antarctic area in the endeavor to learn whether it comprises one land mass or two vast islands. He makes his home in Switzerland, but retains his American citizenship.

ELLSWORTH, OLIVER (1745-1807), an American statesman, born in Connecticut. He distinguished himself in state affairs and in the Continental Congress and was an influential member of the convention which drafted the Constitution of the United States. In 1789 he was elected United States senator from Connecticut and was chairman of the committee which organized the Federal judicial system. He was chief justice of the Supreme Court from 1796 to 1799, and later served the nation and his native state in various high offices.

ELM, a group of trees containing many graceful and valuable species, distributed widely in North America and Europe. No more attractive tree grows than the *white* or *American* elm, with its graceful, vase-like form and slender branches. It grows from seventy-five to 125 feet in height, and is a valuable shade tree for city streets and parks. Boston Common possesses over a thousand beautiful elms, and this tree is one of the most picturesque ornaments of New England roadsides. It is a fairly rapid grower, and is found everywhere east of the Rocky Mountains, from Newfoundland to Florida. The wood is a reddish-brown and is hard, strong and durable. It is used in shipbuilding and for flooring, hubs, barrels and saddletrees. Another American species, the *slippery elm*, is a smaller tree with rough, hairy leaves. It

is so called because the inner bark contains a sweet, sticky substance, pleasant to the taste. Children like to chew this bark, and it is used also as a remedy for sore throat.

The *English elm* is another delightful tree, though differing considerably from the white



ELM LEAVES AND FRUIT

elm. It is of stocky build, with a compact crown, and is a favorite nesting tree for the robin redbreast. There are several fine specimens on Boston Common. The historic "Washington Elm" (which see) is a landmark in Cambridge. Under it Washington took command of the colonial army in 1775.

ELMAN, MISCHA (1892-), a Russian violinist of international fame, one of the foremost of his day. He is admired not only for his mastery of technique, but for his sympathetic interpretations and his genius for producing sweet and powerful tones. Elman was born at Talnoje, and was educated in music at Odessa and at the Imperial Conservatory of Petrograd (then Saint Petersburg). At the Conservatory he studied under Leopold Auer, a famous teacher of violin, and at his first professional concert, in 1904, he was recognized as a violinist of first rank. For several seasons he played in the United States, where he won enthusiastic approval.

ELMIRA, N. Y., county seat of Chemung County, 100 miles southeast of Rochester, on the Chemung River and on the Erie, the Lackawanna, the Pennsylvania and the Lehigh Valley railroads. American Airways maintains an airport here also. The city is noted for its manufacturing establishments, chief of which are railroad shops, steel plate works, rolling mills, iron and steel bridge

works, knitting mills, boot and shoe factories, table factories, glass works, fire engine factory, boiler works and tobacco factories. Elmira is the seat of Elmira College, the New York State Reformatory, the Steel Memorial Library and Arnot-Ogden Memorial Hospital. It has also a state armory, a Federal building, several charitable institutions and seven parks. An interesting feature is a monument to Elmira's noted clergyman and author, Thomas K. Beecher. The national gliding and soaring contests are held at Elmira. Elmira was settled in 1788. It became the county seat in 1836 and was chartered as a city in 1864. Population, 1930, 47,397.

EL PASO, el pa' so, TEXAS, the county seat of El Paso County, on the Rio Grande River. The railroads serving the city are the Atchison, Topeka and Santa Fé, the Mexico North-Western, the National Railways of Mexico, the Southern Pacific, and the Texas & Pacific. The city has three airports and the services of transcontinental and Mexican air lines. Four principal bus lines reach this metropolis.

The city is at the extreme western tip of the state, at the eastern entrance of El Paso del Norte, the lowest pass in the Rocky Mountains. It is west of mid-point in the southern boundary line of New Mexico, and is directly across the Rio Grande from Juarez which is the largest Mexican city on the border.

El Paso is in the center of a semi-arid region with an average annual rainfall of 9.05 inches; the record for sunshine is 80 per cent plus; the mean average humidity is 41 per cent and the mean temperature is 63.6°. Consequently many persons frequent the city as a health resort; numerous excellent sanatoria are available for tuberculous patients.

Elephant Butte Dam, 130 miles north on the Rio Grande, provides water for the irrigation of about 180,000 acres of land. The principal crops are cotton, alfalfa, vegetables and fruits.

Mining and the cattle industry play an important part in the economic life of the city. Industries include smelters, copper refining, petroleum refining, cement plants, brick plants, railroad shops, and flour mills.

Prominent institutions and buildings include the University of Texas College of Mines and Metallurgy, the Scottish Rite Cathedral, the Masonic Temple, the Elks

hall, Loretto Academy, the public library, the Federal building and the county courthouse.

This site was first visited by Cabeza de Vaca in 1536. A mission was built on the site of Juarez, Mexico, in 1659-1668. The first house was built on the American side in 1837. The first name given to the post office was Franklin, but was changed to El Paso at the suggestion of General Anson Mills who surveyed the townsite in 1858. Population, 1930, 102,421.

ELY, RICHARD THEODORE (1854-), an American political economist, born at Ripley, N. Y. He was educated at Columbia College and at the University of Heidelberg, Germany. From 1885 to 1892 he was professor of political economy at Johns Hopkins University, and in the latter year he was made director of the school of economics and political science at the University of Wisconsin. From 1925 to 1933 he served as director of the Institute for Research in Land Economics and Public Utilities, in Northwestern University. His writings include *French and German Socialism and Outlines of Economics*. In collaboration with other writers he has produced numerous works on political science and economics, among these are *The Foundations of National Prosperity*, *Studies in the Evolution of Industrial Society*, and *Property and Contract in their Relations to the Distribution of Wealth*.

ELYRIA, elir' i a, OHIO, the county seat of Lorain County, seven miles south of Lake Erie, on the Black River and on the New York Central and the Baltimore & Ohio railroads. LaPorte Field is available for aircraft. The city is in an agricultural region, and sandstone is quarried. The principal products are steel, sheet steel, tubing, bolts, dies, tools, enameled ware, hosiery, electrical goods, motors and chemicals. Population, 1930, 25,633.

ELYSIUM, elish' eum, or **ELYSIAN FIELDS**, among the ancient Greeks and Romans, the regions inhabited by the good after death. In Homer, Elysium is identical with the Isles of the Blessed—a place to which the gods carry their favorites while still alive; while in Vergil and the later poets it is that part of the lower world where the souls of the good dwell after death.

ELZEVIËR, a famous family of Dutch printers, prominent during the sixteenth and

seventeenth centuries and the early part of the eighteenth. They printed editions of the classics and of French, German and Italian writers. Their works were distinguished for the elegance of their style, and the Elzevir editions of various works, still on the market to-day are proof of the permanent value of the workmanship. A style of type called *Elzevir*, designed by them, is used in present-day printing.

EMANCIPATION PROCLAMATION, a state paper issued by President Lincoln, January 1, 1863, by which all slaves in the states or parts of states actually engaged in rebellion and unrepresented in Congress, or not in possession of the Union armies, were declared free. It was justified as a "fit and necessary war measure" and had been contemplated by Lincoln for many months. When, in September, 1862, Lee was checked at the Battle of Antietam, Lincoln issued a preliminary statement announcing his intention of declaring the slaves free on January 1 if the South in the meantime did not return to the Union. The final proclamation did not legally abolish slavery, but abolition was made effective by the Thirteenth Amendment to the Constitution (which see).

EMBALMING, em balm' ing, a process of treating dead bodies for the purpose of preventing early decay. Modern embalming methods date from the early part of the eighteenth century. The process consists essentially in injecting into the arteries and cavities certain preservative fluids, with which the body is also saturated, and of removing discolorations and other disfigurements. Formaldehyde, mercuric chloride, arsenic, zinc chloride and alcohol are some of the chemicals employed in making the fluids. In the United States the formulas used are not published. Embalming is an art which reached the height of perfection in antiquity, among the Egyptians. They preserved the bodies not only of human beings, but of sacred animals; mummies have been found which resisted decay for forty-five centuries. The exact process employed by the Egyptians is unknown, but the Egyptians excelled modern peoples in the art. See **MUMMY**.

EMBARGO, in international law, an order issued by a government forbidding vessels to leave a specified port or ports. When the vessels of a foreign state are detained, the embargo is said to be *hostile*; when a state

detains its own vessels the embargo is called *pacific*. According to the Hague Convention ships in an enemy port at the time war is declared must be given time to depart. The term is also used with reference to the withholding of supplies from export. During the World War some pressure was brought to bear upon the American government to forbid the export of supplies and munitions to the warring nations, but without success. After America entered the war President Wilson by proclamation placed an embargo on the shipment of supplies to countries in the eastern hemisphere. This matter was regulated by the issuance of Federal licenses. Later the United States entered into special agreement with European neutral nations, whereby the embargo was modified to permit the shipment of foodstuffs.

Embargo Act. The embargo policy was first employed in the United States in 1794, in retaliation for hostile acts in restraint of American trade by Great Britain, but it was removed and was not again used until 1807, when the famous Embargo Act was passed, which detained both foreign and domestic vessels engaged in foreign trade. The act had but little effect upon France and England, the two countries at which it was directed, but it caused great hardship to American ship owners and was repealed in 1809, being replaced by the Non-Intercourse Act. This forbade American ships to enter French or British ports. See WAR OF 1812.

EMBASSY, *em'bas si*, headquarters of an ambassador. The term also refers to the ambassador's suite, including a secretary of legation, a private secretary and a physician, as well as the minor members of his staff and his private family. Members of an ambassador's official suite enjoy certain privileges and immunities in the place to which they are accredited. See EXTERIORITY.

EMBEZZLEMENT, the crime committed by one who makes personal use of property entrusted to him by another. In order to constitute embezzlement, this taking must violate some confidence. Hence, if the user believes himself authorized to appropriate this money, he does not commit embezzlement. Also, the money must come into his possession by reason of his employment. In the case of the appropriation of such funds, the law presumes that the person has embezzled; however, if no criminal intent can be shown, he is released. The offense is a

crime in the statutes of all states and provinces and is punishable by imprisonment, usually for a term of years. Embezzlement differs from larceny in that the embezzler uses property which he holds in his possession, while a person guilty of larceny takes money or goods not held by him.

EMBOSSING, the art of producing figures in relief upon plain surfaces. Leather, paper and fabrics are embossed by means of presses, furnished with dies of the desired pattern. Embossing of metal may be done by hand, by beating the metal from the under side, in which case the work is called *repoussé*. In architecture or sculpture the figures are said to be *alto*-, *mezzo*- or *bas-relief*, according to their prominence. In needlework, embossing is done by embroidering over figures which are padded.

EMBROIDERY, a popular form of needlework, one which develops skill of hand and the artistic sense. In embroidery various patterns are fashioned on silk, cotton, linen, denim or other fabric. The design is usually stamped on the goods in outline, and for convenience the fabric may be stretched over a frame or hoop. There is hardly a home that does not bear evidence of someone's industry in this art. Sofa pillows, dresser scarfs, lunch cloths, table covers and a wide assortment of garments are embellished with embroidery. The art is not difficult for a girl to learn who has a taste for sewing, but it requires patience, neatness and careful attention to detail. Department stores in cities usually have a division of their fancy goods department devoted to this form of needlework. Instruction books and teachers are provided to assist those desiring to learn.

Embroidery is one of the oldest of decorative arts. The ancient Egyptians and Assyrians practiced it to a considerable extent, and from them the Jews, Greeks and Romans learned it. The oldest known embroidery was done in cotton, linen and wool; later, silk came into greater favor. The Chinese and Japanese embroideries are very elaborate, most of the work being done upon silk, with the figures in brilliant colors of silk alone, or combined with gold and silver. Besides silk and gold threads, beads, spangles, pearls and gems are used in the embroidery of the Persians, Turks and Hindus. The so-called Bayeux Tapestry is really an elaborate piece of embroidery. See BAYEUX TAPESTRY.

EMBRYO, *em'bri o*, and **EMBRYOLOGY**, *em'bri o'lo jī*. In biology the embryo is the undeveloped organism from which all plant and animal life proceeds. For example, the embryo of a bean plant is the portion enclosed by the seed coats, and is the part that first awakens to activity under certain conditions of warmth and moisture. In case of a bird the embryo is the part inside the egg shell (see Egg) that develops into a nestling. Embryology is the study of the process whereby the embryo develops into a completed organism. The subject is a fascinating one, and presents many problems which scientists cannot as yet solve.

EMERALD, a well-known transparent gem of pure green color, somewhat harder than quartz. It is a variety of beryl. Its color is due to the presence of chromium. In form the stone is either rounded or a six-sided prism. It is one of the softest of the precious stones, but is not acted upon by acids. Emeralds of large size and free from flaws are rare. The largest on record is said to have been possessed by the inhabitants of the valley of Manta, in Peru, when the Spaniards first arrived there. It was as big as an ostrich egg and was worshiped as "the mother of emeralds." Emeralds were highly valued by the ancients, who are said to have procured theirs from Ethiopia and Egypt. The finest are now obtained from Colombia. The Oriental emerald, though green, is a variety of the ruby and an extremely rare gem. The emerald has been designated as the birthstone for May.

EMERALD ISLE, a popular name for Ireland, given it on account of the rich green of its vegetation.

EMERSON, RALPH WALDO (1803-1882), a beloved American poet and essayist, was born at Boston, Mass. He was graduated from Harvard College in 1821, taught school for five years, and in 1829 became minister of a Unitarian church in Boston. He gave up preaching, although it seems that he was most successful, because he could not accept some of the rites of the Church, notably the Lord's Supper. In 1832 he made a trip to England, where he became acquainted with Walter Savage Landor, Wordsworth, Coleridge and Carlyle. With Carlyle he established a firm friendship, and their correspondence continued for years.

Returning to the United States, he began his career as a lecturer, and it was in this

capacity that he was for a long time best known. His lectures on science, history and biography were very popular, by reason of their exhaustless fund of wit, illustration and anecdote. In 1835 Emerson married Miss Lydia Jackson and went to live in Concord, Mass. His first volume, published in the following year, was *Nature*, in which he definitely set forth his creed. This added much to the reputation which he had made by lecturing. As a member of the group known as Transcendentalists, Emerson was one of the original editors of the *Dial*, a transcendental magazine, founded in 1840. Despite his identification with this movement, he had little to do with the Brook Farm scheme, the impracticability of which he saw from the beginning. (See BROOK FARM)



RALPH WALDO
EMERSON

Among Emerson's most important publications were *Essays* in 1841 and 1844; *Poems* in 1846; *Representative Men*, 1850; *The Conduct of Life*, 1860; *May Day and Other Poems and Society and Solitude*, in 1861; *The Sphinx*, *The Humble Bee*, *The Threnody*, written on the death of his son, *Days*, the *Snowstorm* and *Each and All* are some of his best-known and best-liked poems. Perhaps the most important of Emerson's messages to the world was his teaching that man may rise above circumstances and environment and may make of himself what he chooses; and it is largely through such philosophy as this that he has exerted so wide an influence.

EMERY, a stone of a blackish or bluish-gray color. When ground to powder it is used for making emery wheels, emery cloth and emery paper and for polishing. Emery is a variety of corundum and is composed chiefly of alumina and quartz. It is not acted upon by heat or acids.

EMETIC, a medicine which is administered to cause vomiting. Emetics are very useful in cases of stomach poisoning and in attacks of indigestion when it is important to clean out the stomach quickly. Ipecacuanha is a reliable remedy for croup, as it

is sure to provoke vomiting, and this action brings up mucus from the air passages and stops choking. Besides drugs, emetics include irritants applied to the stomach, such as mustard. A dose of lukewarm water is sometimes sufficient to cause vomiting, and mustard in warm water almost never fails to do so. Emetics should be used with caution, as the sensation of nausea which they create is also attended by a weakening of the vitality.

EMIGRATION. See **IMMIGRATION AND EMIGRATION.**

EMIGRÉS, *a me gra'*, the name applied to those royalists who fled from France during the French Revolution. After the storming of the Bastille in July, 1789, the first exodus took place, and later in the same year, at the time of the attack on Versailles, a larger number left the country. In 1791, when the Constitution was adopted, another large party left, most of them taking refuge in Holland, Germany or Switzerland. Throughout their exile the émigrés were constantly intriguing with foreign kings to bring about the restoration of the monarchy, and the knowledge of this fact drove the revolutionists to desperation and had much to do with many of the atrocities which were committed. Napoleon, on gaining the consulship, permitted the return of the émigrés. At the time of the Bourbon restoration, they were refused the right to regain their estates or privileges.

EMINENT DOMAIN, the right of a state to force the sale of private property when that property stands in the way of, or is needed for, public enterprises. It is far more common in the United States than in any other country. Congress, with whom the power lies, is limited in its exercise by the Constitution, which declares that no person shall be deprived of property "without due process of law," and that "private property shall not be taken for public use without just compensation." The purposes for which the right may be exercised are many, including not only improvements under the direction of the government, but also public utilities under private ownership and management, such as railroads, street cars and such.

EMIN PASHA, *o'meen pa shah'* (1840-1892), whose real name was Edward Schnitzler, was an African explorer, governor and army surgeon. He was born at Oppeln, Prussia, studied at Berlin and Königsberg, and

took a degree in medicine. In 1865 he was appointed surgeon of the Turkish army, and later became surgeon-general of the Egyptian army in the Sudan. General Gordon appointed him in 1878 governor of the equatorial provinces in the Southern Sudan. In 1887 the Egyptian government made him a pasha. When two years afterwards the provinces rose in revolt, he was deposed and imprisoned. On his release he left the country, and was assassinated by Arabs while on an exploring expedition in East Africa.

EMMET, ROBERT (1778-1803), an Irish patriot. He left Ireland in 1798 after his expulsion from Trinity College, Dublin, for exciting rebellion. After spending some time on the Continent and receiving from Napoleon a promise of aid in a struggle for Irish independence, he returned to Ireland and became a member of the Society of United Irishmen, a society which had for its object the independence for Ireland. In July, 1803, he became the leader in a rebellion, was arrested and after a few days, tried and executed. His speeches in his own vindication have been regarded as models of patriotic eloquence.

EMOTIONS, certain complex feelings aroused by experiences or events that impress one as agreeable, disagreeable, pleasurable, etc. Joy, grief, affection, hope, anger, disgust and fear are typical emotions. Authorities classify the emotions in various ways. One school of thought divides them into the *egoistic*, the *altruistic*, the *moral* and the *religious*. The egoistic relate wholly to self; the altruistic, such as love and anger, are exercised towards objects outside the self, and the moral and religious are combinations of both the egoistic and the altruistic. The moral emotions arise from relations of human beings to one another. They give us the sense of right and wrong, and in so far as they are responsible for our moral standards are strongly egoistic, while in so far as they are exercised towards others, they are altruistic (see **ETHICS**). The religious emotions are closely allied to the moral and arise from contemplating one's relation to a supreme being. They constitute the highest sentiments of which the mind is capable.

The emotions are expressed in a variety of ways, by the eyes, by the countenance, by gesture and by the tones of the voice, as well as by words. When they are strong they affect the organic functions, such as

breathing, circulation and digestion. The emotions increase in strength by continued excitement of them and they exert a strong influence over character and happiness. It is unwise to cultivate any emotion to excess. Anger over-indulged may lead to murder, and joy to hysterics. People have been known to die of excessive emotion.

EMPEROR, a title given to a ruler, in rank superior to that of king; specifically, the royal head of confederation of states or of an empire. The end of the World War in 1918 banished the term almost entirely from actual application. The emperors of Germany and Austria-Hungary were forced to abdicate, and these two were the most conspicuous examples of autocratic rule among free nations. Only the emperor of Japan and the king of Great Britain, as emperor of India, remained of the many who once reigned. Ethiopia had an emperor until the Italian conquest (1935-1936).

EMPIRE, a number of relatively small states joined in one supreme government, at the head of which is an emperor as chief executive, but in which each state maintains its own government for local purposes. This is the typical empire, though there are and have been notable exceptions. An empire may be a single small country, whose ruler is styled emperor. Such a country is Ethiopia. The best structure of empire is the present British pattern. The expanding Japanese Empire, with its continental outposts, is another good example.

EMPIRE DAY, a day set apart throughout the British Empire for patriotic observance in school. The date is May 23. The exercises include the singing of national airs, saluting the flag, reading suitable essays, reciting patriotic verse and reviewing British history and geography. The object is to inspire children with the higher ideals of citizenship and patriotism. All repeat the motto of the day: "One King; one Flag; one Fleet; one Empire," and learn to give the rallying cry: "For God; For Duty; For Empire."

The idea of Empire Day originated with Mrs. Clementina Fessenden, a Canadian, in 1897. The day is observed in Canada, India, Australia, South Africa and in British island possessions.

EMPLOYER'S LIABILITY. An employer's liability law is one which defines the responsibility and obligations of an employ-

er in respect to injuries which his workmen receive while engaged in their work for him. Such laws have superseded the interpretations of courts under the common law, whereby most of the risks were assumed by the worker. These later laws were defective, in that the injured workman had to prove that the fault was with the employer, and this was sometimes a difficult thing to accomplish. A further development has been the enactment of *workmen's compensation* laws, by which damages for injuries are awarded automatically.

Practically all the states of the Union have enacted such laws, as well as Alaska, Hawan and Porto Rico. In 1916 Congress passed a Federal compensation law covering all civilian employments of the United States government and the Panama Railroad. The New York law, effective July 1, 1914, and amended several times since then, is typical of the most advanced legislation on the subject. It provides compensation for accidental injuries and for diseases or infections contracted unavoidably, in a number of specified occupations. Each employer must insure in a state fund or mutual or stock company, or else must give proof of his financial ability to make payments. Disputes are settled by the State Industrial Commission, with limited appeals to courts.

The subject of workmen's compensation is handled in Canada by the individual provinces. Legislation along this line has been adopted in most of the other British possessions, in nearly all of the European countries and in a few South American republics.

EMPLOYMENT BUREAU, *bu'ro*, any agency intended to bring together employers and the unemployed. There are several kinds of such bureaus; among these are agencies privately owned and operated for gain, agencies privately operated for philanthropic purposes, trades-unions, and free government bureaus. These last have for their object the adjustment of the entire labor market and the consequent improvement of the general economic conditions, whereas trade unions provide only for their own members.

In the United States for many years the private agencies for assisting the unemployed were considered adequate to meet the requirements. The great fluctuations in industry, however, often threw many workers out of employment. To meet these conditions several States created employment

bureaus, which, either for a small fee or gratis, assisted laborers to find work. The vast number of unemployed occasioned by the business depression which began in 1929 led the Federal Government to organize a nation-wide service, in which State and private agencies were coordinated to bring employer and workman together. This service has proved most effective.

EMPORIA, KAN., the county seat of Lyon County, sixty miles southwest of Topeka, on the Atchison, Topeka & Santa Fé and the Missouri, Kansas & Texas railroads. The city is in a region devoted to farming and stock raising and contains wholesale houses, foundries, stock food and flour mills, canning, cigar and other factories. The Santa Fé has a large railroad and stockyards here. A state teachers' college having ten buildings is located here, and the city also contains the College of Emporia, a conservatory of music, a Carnegie Library and a railroad library. It was settled in 1856 and was incorporated in 1870. The commission form of government has been adopted. The city is the home of William Allen White (which see), widely known as one of America's leading publicists and writers. Population, 1920, 11,273; in 1930, 14,067.

BMS, GERMANY, a famous watering place, situated in the district of Wiesbaden, in Hesse-Nassau. It is ten miles southeast of Coblenz, on the Lahn River. It was a bathing resort even in the time of the Romans, and since the fourteenth century has been much frequented because of its warm mineral springs, remarkable for their curative properties. In normal times the place is visited by more than 10,000 patients and many tourists each year. In 1172 the counts of Nassau gained possession of Bms, and in 1866 it was united with Prussia. The permanent population of the town is about 7,100.

EMU, or **BM'EU**, a three-toed Australian bird, related to the ostrich, cassowary and rhea. It is large, sometimes weighing 130 pounds, and is distinguished by the absence of a casque, or helmet. Its feathers, which are double, are of a dull, sooty brown; those about the neck and head are hairlike in texture. There are two plumes to each quill, but these have no commercial value. The bird has small, useless wings, but it can run with great speed and uses this method of escape from enemies on the plains. If brought to

bay it fights viciously, kicking backward with much force. It is very easily tamed and may



THE EMU

be kept out of doors in temperate climates. The flesh is eaten by natives.

EMULSION, a liquid mixture in which minute fatty or resinous globules are held in suspension. Milk is a natural emulsion, largely of water and butter fat. A large number of emulsions are manufactured out of water and certain oily or resinous substances, made to mix by a third ingredient, and sold for medicinal purposes.

ENAMEL, *en am'el*, a glaze applied by fusion to gold, silver, copper or other metal surface or to porcelain. The art of enameling, which is of great antiquity, was practiced by the Assyrians and by the Egyptians, from whom it may have passed into Greece and thence into Rome and its provinces, where various Roman antiquities with enameled ornamentation have been discovered. During the twelfth and fourteenth centuries, the Italians acquired considerable skill in enameling, and their work became famous in all the countries of Europe.

The basis of all kinds of enamel is a perfectly transparent and fusible glass, which is rendered either semitransparent or opaque by the mixture of metallic oxides. White enamels are made by melting the oxide of tin with glass and adding a small quantity of manganese or phosphate of calcium to increase the brilliancy of the color. Enamel is used for glazing the cheaper varieties of

pottery and for coating iron vessels for domestic purposes, the protection of the insides of baths, cisterns, boilers and the like. Enameling in colors upon iron is now common, iron plates being thus treated by means of various mixtures, and words and designs of various kinds being permanently fixed upon them by stenciling.

ENCYCLOPEDIA, *en si klo pé di a*, or **CYCLOPEDIA**, a book or set of books in which various departments of knowledge are treated by means of separate articles, in most cases arranged in alphabetical order. A general encyclopedia, such as the one containing this particular article, treats of practically all branches of learning. There are, however, many special encyclopedias in circulation, such as those devoted wholly to biography, to literary subjects, or to medicine.

The oldest work of an encyclopedia nature of which we have any knowledge is Pliny's *Natural History*, but this was far from being a reference work in the modern sense of the term. Several works of a similar character were produced in the Middle Ages, but the name encyclopedia was not applied to any of them until 1559. The term is derived from the Greek word for *circle*, and at first signified the group of subjects which an educated man was supposed to study.

The first English alphabetical encyclopedia was the *Lexicon Technicum*; or an *Universal English Dictionary of Arts and Sciences*, published in 1704. Ephraim Chambers published in 1728 his *Cyclopaedia*; or an *Universal Dictionary of Arts and Sciences*, which had many distinctive features, especially the use of cross-references to facilitate topical reading, and which had considerable influence on succeeding works of its kind, both in England and on the Continent. The famous French *Encyclopédie*, edited by Diderot, D'Alembert, Rousseau and others, was intended at first as a translation and revision of Chambers' work, but grew into something much more ambitious. Of a somewhat different type from the dictionary style of encyclopedia, described above, is the *Encyclopaedia Britannica*, first published in 1768, which laid stress on important articles on general subjects, rather than on numerous short articles on the subdivisions of these subjects.

Besides those mentioned above, the larger encyclopedias in English include the *Encyclopaedia Americana*, Johnson's *Universal Cyclopaedia*, later editions of the *Encyclo-*

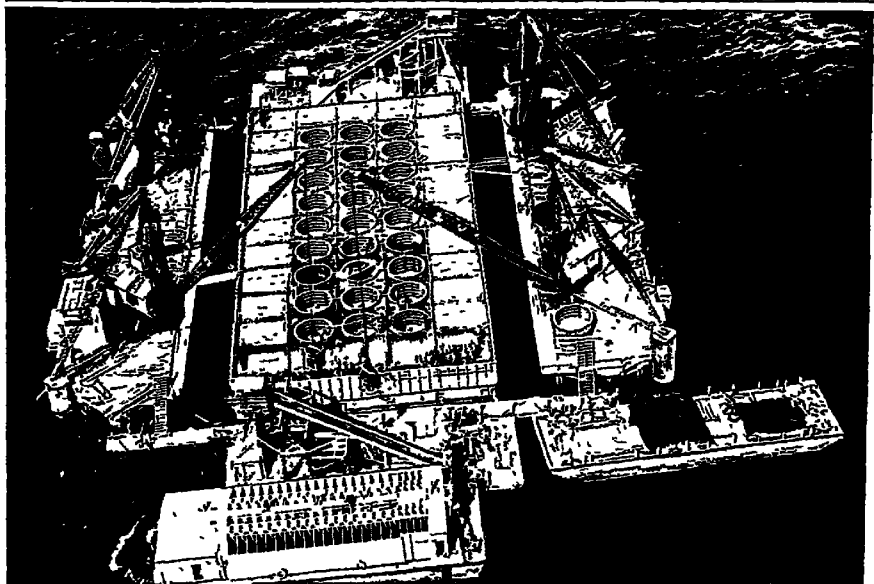
paedia Britannica and the *New International Encyclopaedia*, in over twenty volumes. Of French encyclopedias the most important are the *Encyclopédie des gens du monde*; the *Encyclopédie moderne*, and the *Encyclopédie du XIX^{ème} siècle*. The German *Konversations-Lexikon* of Brockhaus, in seventeen volumes, the *Konversations-Lexikon* of Meyer, and a modern Italian encyclopedia (1934), with supplementary numbers, are among the best. An encyclopedia dealing with the Roman Catholic Church is a well-known publication.

ENDICOTT, JOHN (1588?-1665), one of the founders of Massachusetts Bay Colony, and its first governor. He was born in Dorchester, England, and joined the exodus of Puritans to the New World in 1628. He was governor of the colony for several terms and was an uncompromising ruler. Two members of his council who wanted to use the Episcopal prayer book in public worship were, at his command, sent back to England. During his administration several Quakers were put to death in Boston. Endicott was a warm disciple of Roger Williams. He always displayed independence of established custom and authority. He was responsible for the establishment of a colonial mint in 1652.

ENDIVE, a plant belonging to the same genus as the chicory, cultivated for its root leaves. When blanched, or whitened, these leaves are used in soups and as a salad. There are several varieties of endive, including the curled, narrow-leaved, and the broad, straight-leaved. The former is preferred by Americans. Endive grows well in good soil, and needs about the same care as lettuce, except that it is necessary to blanch the leaves. This is accomplished by tying the outer leaves together. The plant is slightly bitter to the taste.

ENDLESS SCREW, a popular name often given to a screw or other spiral contrivance upon a cylindrical surface which meshes or engages with a toothed wheel. The screw and wheel are on axes at right angles to each other. When the screw turns the wheel turns. This screw is used in fine mechanical adjustments where great precision is required, such as telescope mountings, in the transmission mechanism of motor vehicles and in electric elevators.

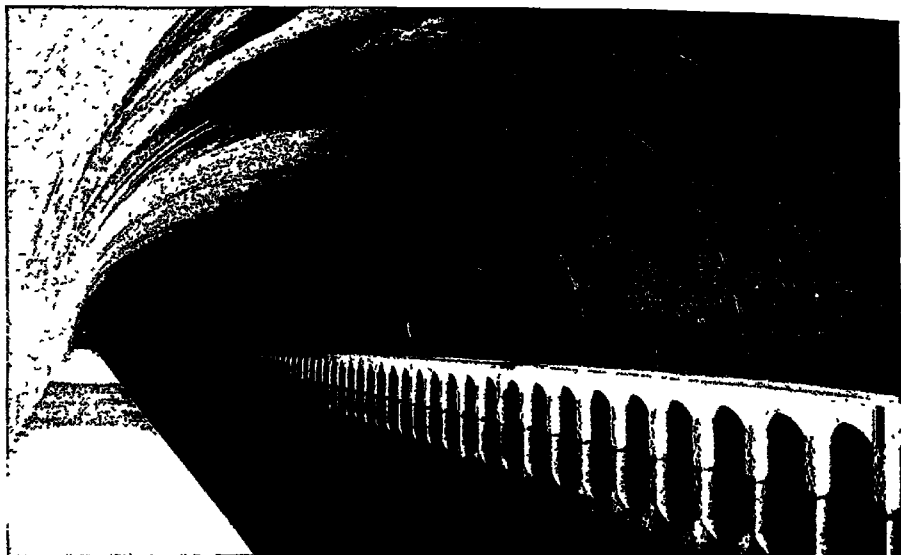
ENDYMION, *en dim'i on*, in Greek mythology, a shepherd of great beauty, who won



Iving Gallows

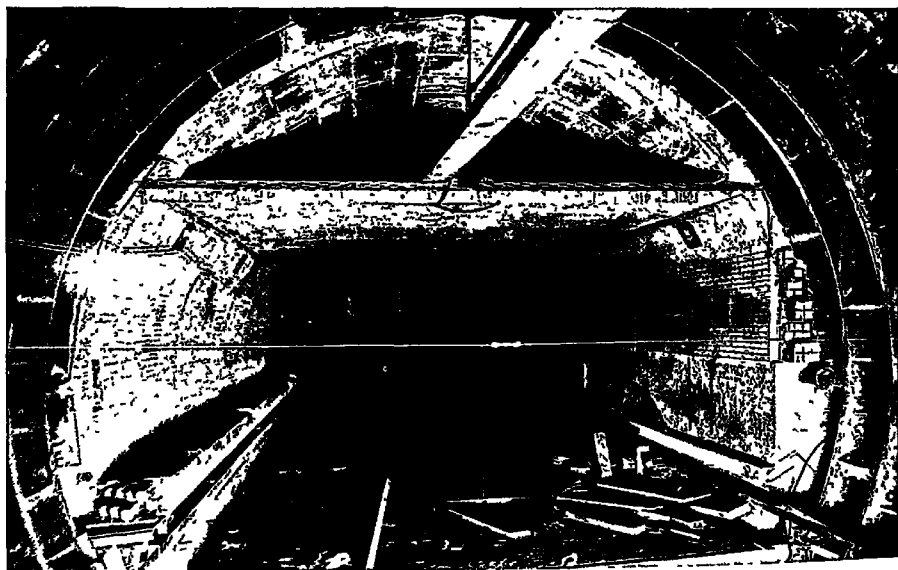
MODERN ENGINEERING MIRACLES

Above, a view of New York's new Triborough Bridge, under construction; the bridge anchorage and tower piers are shown, with connecting cables. Below, an air-flotation caisson, showing the method of construction of under-water structures necessary in the building of the great San Francisco-Oakland Bridge.



INSIDE THE ROVE TUNNEL

Connecting the port of Marseilles, France, with the River Rhone, $4\frac{3}{4}$ miles long, 80 feet wide, canal 15 feet deep



Photos by U & U.

HOLLAND TUNNEL UNDER HUDSON RIVER

The steel cylindrical tube is lined with concrete and spaces outside the traffic way are used for ventilating flues, conduits for lighting, wiring and other services

the love of Selene (Diana). There are several versions of the myth. According to one, Selene, seeing the shepherd one night as he lay asleep on a hillside, left her chariot and kissed him. Fearful lest age should lessen his beauty, she begged for him from Zeus (Jupiter) the gift of endless sleep and carried him off to a cave on Mount Latmus.

ENEMY, in international law, either of two sides in a conflict of nations from the standpoint of the other. While any officer of a belligerent nation is considered, strictly, an enemy of the other party to the struggle, modern usage has practically determined that minor civil officers, not in any way connected with the war, and non-combatants of nations at war are not liable to capture, detention or punishment. It was violation of this law which brought down upon Germany the wrath of her enemies in the recent World War. For a statement of the general rules of international law in force during times of war, see article WAR; INTERNATIONAL LAW; NEUTRALITY.

ENERGY, *en'ur jy*, in physics, the power which a body or system possesses for doing work. Energy is of two kinds, *potential*, or possible, energy, due to position, as that of a sledge in air or a stone propped upon the side of a hill, or the energy which lies dormant in explosives, such as shrapnel. When the sledge descends, the stone rolls downhill or the gunpowder explodes, this passive energy is converted into active, or *kinetic* energy, producing motion. All energy is convertible, but it cannot be created or destroyed. An electric light plant using steam power affords an excellent illustration of the change of potential to kinetic energy. The potential energy in coal is made active by burning, which causes it to give off heat. The heat is used in changing the water to steam and this is then transformed to motion in the engine. The motion is imparted to the dynamo, which in turn generates the electric current, and this is changed back to heat in the electric light. Some of the heat generated by the coal is consumed in the running of the engine and the dynamo and in traversing the wires, so that it is not all converted into light, yet it is all used in one form of energy or another.

ENGINE. See GAS ENGINE; STEAM ENGINE.

ENGINEERING is both the art and the profession of construction. The men who

practice it are known as engineers, but as this great division of skilled labor is highly specialized, they are commonly referred to as *civil* engineers, *mining* engineers, *electrical* engineers, *mechanical* engineers, etc.

The world owes a vast debt to the specially trained men who have performed seeming miracles one after another until we are no longer surprised at the feats which have added immeasurably to comfort, to business, to pleasure and to the wealth of the world.

The men who behold a stream trickling down a mountain side and who guide that stream through ditches and sluices scores of miles that it may make fertile millions of acres of arid land are *civil* engineers, and empire builders. They who build great power houses and fill them with dynamos and harness these to waterpower so the electric current can be sent cheaply hundreds of miles to light cities and turn the wheels of industry are *electrical* engineers. The patient men who once looked upon a two-cylinder automobile engine and found it good, but not good enough, then developed it into the present twelve-cylinder engine are *mechanical* engineers.

The engineers of the world have built monster bridges with no supports for a third of a mile; they have built fortresses which it was thought no cannon could crumble, and other engineers have straightway constructed guns that would destroy them; they have laid ribbons of iron across a continent, opening vast areas to homes for future generations, they have sunk foundations scores of feet to bed-rock and on these sure supports have projected buildings skyward until under their unerring mathematics there is no limit to the heights to which structures may be safely built. These are some of the amazing things that engineering has accomplished.

The work of the world calls more and more for specialized knowledge, and to-day any man's hope is only that he may master one branch of useful learning. There is no profession more honorable or more remunerative than that of engineering. It requires special aptitude, however. The engineer must thoroughly understand all of higher mathematics; the boy with a settled dislike for arithmetic would doubtless fail to qualify along the route of trigonometry and calculus for an engineer's diploma. The boy who has no liking for machinery would have to be very optimistic to believe that he would

succeed in an engineering career. In addition, the engineer must be a leader of men; no others need aspire. Their brains conceive and other men must execute, under his strict orders. Given the latent talent, a capacity for hard work, a readiness to wear overalls and to breast the elements under the open sky, any boy may hope to become an engineer. He will find a score of great schools equipped to speed him along.



ENGLAND, the chief political division of the United Kingdom of Great Britain and Northern Ireland, occupies the southern portion of the island of Great Britain. England has a unique place among the nations. In area not much larger than New York, in importance it is second to no other country on the globe, and its influence on the world's history has been profound. It is the center of an empire which reaches to every continent and borders on every ocean; the seat of government of this great domain, the city of London, is the largest city in the world, if the entire metropolitan area is included.

Location and Size. The island of Great Britain is composed of three political divisions—England, Scotland and Wales. England lies south of Scotland and is separated from it by the Cheviot Hills, the River Tweed and Solway Firth. Wales is a broad peninsula jutting out from the west coast of the island mass, which is separated from Ireland by the Irish Sea and Saint George's Channel. The English Channel, Strait of Dover and North Sea separate England from the continent of Europe.

The area of England, exclusive of Wales, is 50,874 square miles; thus it is between Alabama and New York in size. Its greatest length from Tweedmouth, in the northeast, to Saint Alban's Head, on the south, is nearly 365 miles, and its greatest width, from Land's End to North Foreland, is 320 miles. The coast line is very irregular, cut on all sides by deep indentations, which form fine harbors.

The People and Their Cities. At the decennial census of 1931 there were living

in England about 37,794,000 people, over three times as many as live in the state of New York. Almost eighty per cent of the inhabitants live in cities or towns, a proportion of urban population nowhere else equaled. Besides the city of London, England has seventeen municipalities with more than 200,000 inhabitants, and forty-four with populations ranging from 100,000 to 200,000. The seventeen referred to are Birmingham, Liverpool, Manchester, Sheffield, Leeds, Bristol, West Ham, Bradford, Kingston-upon-Hull, Newcastle-upon-Tyne, Nottingham, Stoke-on-Trent, Salford, Portsmouth, Plymouth, Leicester and Croydon.

At the census of 1931 the average density of population per square mile was 743, as compared with 41.3 for the United States by 1930 census. It is thus evident that England is at present one of the most densely populated countries. No other European country is so thickly settled; Belgium is second, with a density of 700.

The English people exhibit decided racial characteristics. Tenacity is so marked a national trait that the expression, "to hang on like John Bull," has become proverbial everywhere. England's armies have taken blow upon blow, but never have they lacked the resolution to hit back, and it has been commonly said that "the English soldier can fight as long as any other soldier—and fifteen minutes longer." The English are a people who grow strong under adversity. This quality of endurance has had much to do with shaping their history. From an early period the common people have persistently labored for their rights, and to-day England, though a monarchy in name, has one of the most democratic governments in the world.

The people of England have excelled, too, as explorers and colonizers. That small country, with its 2,000 miles of coast line, bred a race of sailors and became the "mistress of the seas." Its people have gone as colonizers to every continent, and it is significant that among its colonies are some of the world's self-governing nations, such as Canada, South Africa and Australia.

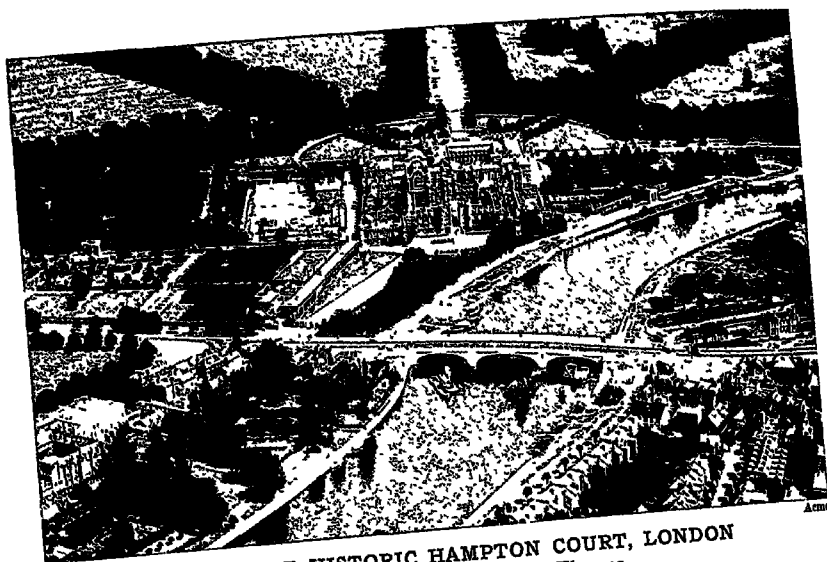
In science the English are surpassed by no other race in creative achievements. It was an Englishman who discovered the law of gravitation, and an English scholar who worked out the theory of evolution, perhaps the most important scientific discovery of modern times. In chemistry and in medicine



1—Canterbury Cathedral; War Memorial Cross in foreground.

2—Durham Cathedral

3—Airview of Windsor Castle, one of the most magnificent royal residences in the world.



AIRVIEW OF HISTORIC HAMPTON COURT, LONDON
Showing new bridge across the Thames.



THE BANK OF ENGLAND, LONDON
Showing the five added stories completed and occupied in 1933.

their contributions have been no less notable, and from England came those inventions that made a new industrial world—the steam engine and locomotive, the power loom and the Bessemer process of making steel. Finally, the English have produced a literature that is the equal of the best in the world.

Education. Before the World War England's national educational system was defective in that it lacked centralization and authority, but in the midst of that great struggle the nation came to realize the need of reforming the system. An educational bill supplementing previous acts and reorganizing the public schools was passed by Parliament in 1918, receiving the king's signature in August of that year. The act is effective for England and Wales. Local educational units throughout the country are required to maintain both elementary and continuation schools, half the expense of which is met by the national government. Attendance on the elementary schools is compulsory for children from five to fourteen years of age, and children who have not received full time elementary education must attend the continuation schools until they are sixteen. In 1925 this limit was raised to eighteen years. The number of hours per year which must be spent in the continuation schools is 320. Schools exemptions under the age of fourteen were abolished, and child labor of school children under twelve forbidden.

The well-to-do classes of England have always sent their children to private schools, but the act of 1918 is part of a movement to make the educational system more democratic. Famous among the private institutions for boys are the schools at Eton and Rugby. There are several great universities, the oldest and most famous being Oxford and Cambridge, described elsewhere in these volumes. Besides these institutions there are the universities of London, Durham, Birmingham, Liverpool, Leeds, Sheffield and Bristol, and the Victoria University of Manchester.

Surface and Drainage. England is noted for the picturesque character of its country landscape, but it possesses no scenery like that of Switzerland or Scotland. The highest elevations are in the northern part of the country. Here is located the Pennine Chain, whose highest point, Cross Fell, has an altitude of 2,930 feet. West of Pennine range and its adjoining Cumbrian range is another, whose average altitude is greater.

This extends southward and covers the greater part of Wales. South of the Bristol Channel and extending into the point of land comprising the counties of Somerset, Devon and Cornwall, is the Devon range, which is much lower than the ranges in the north. In the extreme northwest, between Morecambe Bay and Solway Firth and occupying the counties of Cumberland and Westmoreland, is the Lake District, so called because it contains a number of small mountain lakes, noted for their beauty. In this region is the highest point in England, Scafell Pike, 3,210 feet. All of the southern and eastern portion of England is low land and consists of rolling country, with slight rounded elevations separated by more or less broad, undulating valleys.

England is well supplied with rivers, many of them of great importance to industry and commerce. Nearly all of these flow into the North Sea. The most important streams are the Thames, on which London is located, the Ouse and the Humber, flowing into the North Sea, and the Mersey and the Severn, flowing into waters tributary to the Atlantic. Other streams worthy of mention are the Tyne, Wear and Tees, in the northeast, and the Eden, Ribble and Dee, in the northwest.

Climate. England lies as far north as Labrador, but its climate is tempered by the Gulf Stream; its winters are therefore comparatively mild, and its summers are cool. Dense fogs are frequent, especially in London, where they are intensified by the soot and smoke of that huge industrial center. The country enjoys an abundant rainfall, especially in the Lake Region, where it is over sixty inches a year.

Mineral Resources. England contains extensive deposits of coal, iron ore and clays, and it furnishes about three-fourths of the entire mineral products of the United Kingdom. Minerals of lesser importance are copper, zinc, tin, salt and gypsum. The coal areas extend irregularly from north to south, slightly west of a line drawn through the center of the country. The average annual coal output exceeds two hundred million tons, but this quantity is none too great to meet the country's needs. The iron ore and limestone necessary for a flux in smelting occur in or near the coal regions. Tin is found in Devon and Cornwall.

Fisheries. The fisheries are important, and the larger part of the fish taken by the

United Kingdom is obtained off the coasts of England and Wales. The most important centers of the industry are Grimsby, Hull and Yarmouth, and nearly all of the product goes to London, which is the largest fish market in the world. Herring, haddock, cod and mackerel are the varieties taken in largest numbers.

Agriculture. The agricultural system in England is on a different basis from that in most other countries. The greater part of the cultivated land is owned by a comparatively small number of landlords, who parcel out their estates in small sections and rent them to tenant farmers. Since these small farms usually remain generation after generation in the hands of the same family, the system tends to develop a sense of ownership among the tenants. The abuses and the advantages of this system are brought out clearly in such stories as George Eliot's *Adam Bede* and Mrs. Humphry Ward's *Robert Elsmere*.

The land is very fertile, and the most improved methods of cultivation are followed, but, nevertheless, before the outbreak of the World War England did not raise enough agricultural produce to feed the home population. Grain could be imported cheaper than it could be raised at home, and foodstuffs were shipped there in great quantities. The demands of the war entirely changed English agriculture. Large areas of lovely park and meadow land, untouched by the plow for centuries, were brought under cultivation, and every labor-saving device that could be used to advantage was put to service. Especially valuable was the tractor for plowing, and women proved to be very capable in running this machine. Wartime wheat yield for England and Wales was estimated at 57,317,000 bushels, that of barley 46,162,000, and that of oats 99,717,000. The potato crop at the same was about 124,278,000 bushels, and there was a correspondingly large yield of other garden vegetables. It is not likely that England will ever return to the old system, now that the country has learned to feed itself.

Stock raising is a very important branch of agriculture. England raises several famous breeds of stock, notably the Durham and Devonshire breeds of cattle, the Cotswold and Southdown sheep, and the Berkshire pigs.

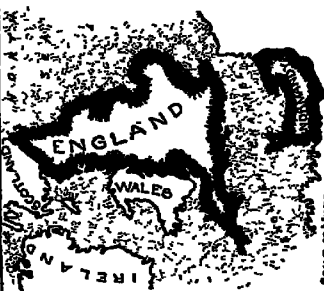
Manufactures. England is one of the greatest manufacturing countries in the

world, more than five times as many people being engaged in manufacturing as in agriculture. The chief manufacturing centers are in the vicinity of the coal and iron fields, extending from the center of the country northward along the western side. The most important industry is the manufacture of textiles, in which cotton and woolen goods take the lead. Manchester is the chief city of cotton manufacture and the largest center of this industry in the world, and the county of Yorkshire contains the largest number of woolen mills, the center of the industry being at Leeds. The great iron foundries are found in the central counties in and about Birmingham and Sheffield, the latter city being noted for its manufacture of cutlery of all kinds. Aside from these great industries, there are numerous others, such as the manufacture of pens, pins, needles and countless other small articles and small wares. In itself each of these industries is comparatively unimportant, but when taken together, they constitute an important factor in the manufacturing industry of the country and of the world. The position which England has held for so long as a manufacturing nation is due to the presence of large quantities of coal and iron, to a temperate climate, to facilities for reaching the markets of the world and, perhaps more than all else, to the ingenuity and industry of the people.

History. England's recorded history begins with the invasion of the island (then called Britain) by Caesar, in 55 B. C. Before that time the Phoenicians, Carthaginians and Greeks had visited it to procure tin. It was not until the time of Claudius, nearly one hundred years after Caesar's invasion, that a serious attempt was made to reduce Britain to the condition of a Roman province, and it was not until the time of Agricola that the inhabitants may be said to have been in any degree Romanized. The entire island did not submit to the Romans at any period, and at various times walls were built across it to ward off the attacks of the northern tribes whom the Romans had been unable to subdue. Under the Roman dominion the southern part of the island advanced considerably in civilization. Flourishing towns were built, great roads were constructed and Christianity was introduced. But soon after the beginning of the fifth century, the Romans found it necessary to

ENGLAND

To the Norman Conquest



SCALE OF MILES
0 50 100

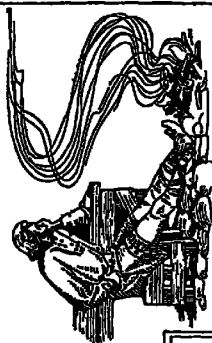
DOWNINGS OF WILLIAM THE CONQUEROR (IN
BLACK) AFTER THE BATTLE OF HASTINGS

Great Men

St Augustine	— A.D.	597	430
Cassiodorus	—	571	680
The Venerable Bede	—	673	735
Alfred the Great	—	849	901
St Dunstan	—	957	988
Canute	—	994	1035
Edward	—	1004	1066
Harold	—	1012	1066

Chronological Summary

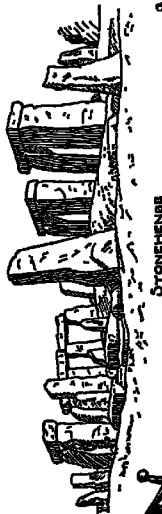
First Visit of Julius Caesar to Britain	B.C. 55
Roman Troops Withdraw	A.D. 407
Landing of Hengist and Horsa	— 449
Æthelbert became King	— 589
Alfred the Great became King	— 871
Canute became King	— 1016
Edward the Confessor became King	— 1042
Harold Elected King	— 1066
Battle of Hastings	— 1066



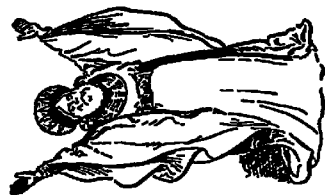
THE LEGEND OF ALFRED AND THE CAKES



COIN OF KING EDGAR
RULER FROM 925 TO 975



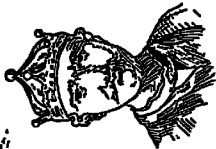
STONEHENGE



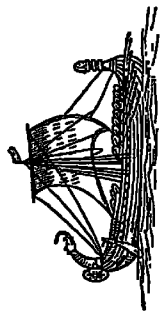
A DANISH PRIEST IN OFFICIAL DRESS
THE KING OF DENMARK AND THE KING
OF SWEDEN AS THE GOTHIC PRINCE



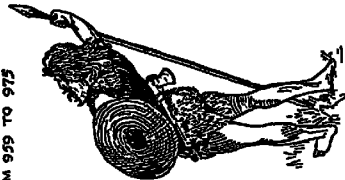
HAROLD (FROM AN OLD COIN)



WILLIAM THE CONQUEROR



NORMAN WAR VESSEL
ELEVENTH CENTURY



BRITON OF THE 3RD CENTURY

withdraw their armies from Britain, and the inhabitants of the country who had been for centuries protected by the Romans, found themselves utterly unable to repel the invasions of their northern neighbors. They therefore called on the Jutes to aid them, but soon found that the Jutes intended to repay themselves by making settlements on the island. Other tribes from the mainland, chief among them the Angles and the Saxons, also descended upon Britain and soon overran the country. The English of to-day have strains of all these peoples.

Of the political divisions into which the conquered territory was divided by the Angles and Saxons, the most conspicuous were the seven small kingdoms commonly known as the *Heptarchy*. Gradually the more powerful of these came to dominate the weaker ones, and by 827 Egbert, king of Wessex, had made himself king of the entire country. From this year the kingdom of England (Angle-land) may be considered to date, and Egbert's descendants ruled in England, with the exception of a short period of Danish power, until 1066. In the early strife between the Angles and the Saxons, the civilization of the Romans had been completely overthrown, and Scandinavian mythology had taken the place of primitive Christianity. By the sixth century, however, the Christian religion had been reintroduced by Saint Augustine and his successors.

Meanwhile, the Danes had been constantly harassing the coast, and they gradually obtained a firm foothold on the island. When Alfred the Great ascended the throne, in 871, he found them practically masters of his kingdom. But he succeeded in reducing their power, confined them to a certain part of the country and forced them to do him homage. The successors of Alfred, Edward (901-925) and Athelstan (925-940), were again obliged to contend with the Danes, who were constantly issuing from the Dane-lagh, the territory to which Alfred the Great had confined them. Among the chief political characteristics of the rule of the Saxons in England was the growth of the power of the king, and the early establishment of the Witenagemot, without the sanction of which the king was supposed to undertake nothing of importance. A really strong king, however, might often set aside the Witan and rule almost absolutely.

By 1013 the Danes under Sweyn had made

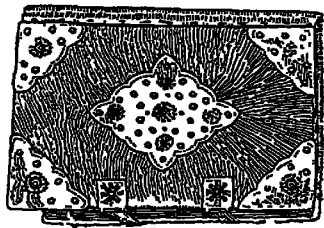
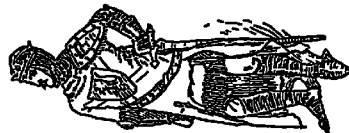
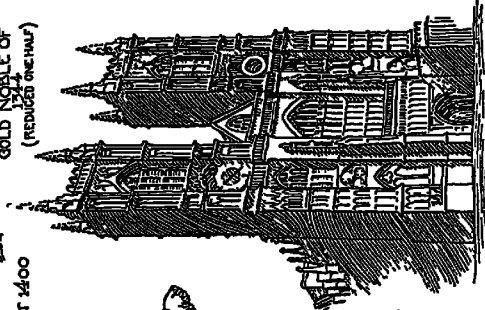
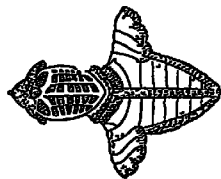
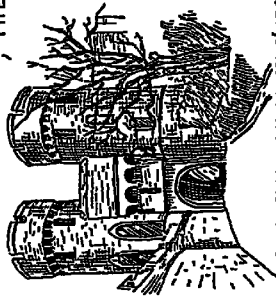
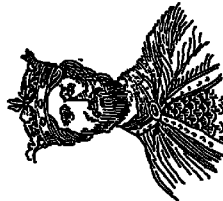
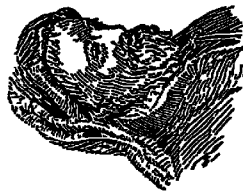
themselves masters of the greater part of England, and Sweyn's son Canute, who succeeded him in 1016, firmly established the Danish rule. Harold and Hardicanute succeeded Canute, and on the death of Hardicanute in 1042 the English line again came to the throne in the person of Edward the Confessor. Edward died in 1066, and Harold, his brother-in-law, was chosen king. He ruled but a few months, however, as William of Normandy, who claimed the throne partly through his relationship to the royal Saxon line, partly through a promise which he said had been made him by Edward the Confessor, descended upon England in 1066 and defeated Harold at the Battle of Hastings. By Christmas day William had brought a large part of the island into subjection, and on that day he was crowned in London. It was not until some years later, however, that the complete subjugation of the island was accomplished.

With the reign of William I begins the history of united England, and the monarchs who have ruled since then are shown in the following table:

RULER	DATES OF REIGN
William I	1066-1087
the Conqueror	
William II	1087-1100
Henry I	1100-1135
Stephen	1135-1154
Henry II	1154-1189
Richard I	1189-1199
John	1199-1216
Henry III	1216-1272
Edward I	1272-1307
Edward II	1307-1327
Edward III	1327-1377
Richard II	1377-1399
Henry IV	1399-1413
Henry V	1413-1422
Henry VI	1422-1461
Edward IV	1461-1483
Edward V	1483-1483
Richard III	1483-1485
Henry VII	1485-1509
Henry VIII	1509-1547
Edward VI	1547-1553
Mary	1553-1558
Elizabeth	1558-1603
James I (Stuart)	1603-1625
Charles I	1625-1649
(Commonwealth)	1649-1660
Charles II	1660-1685
James II	1685-1688
William III	1689-1702
Anne	1702-1714

During the reign of Anne, in 1707, the two countries of England and Scotland were united constitutionally, and the title of the sovereign became officially not *King of Eng-*

ENGLAND DURING THE MIDDLE AGES



Chronological Summary

William I	1066
Domesday Book	1086
William Rufus	1087
Henry I	1100
Stephen	1135
Henry II	1154
Thomas A Becket	1170
Richard I	1189
King John	1199
The Magna Charta	1212
Henry III	1216
Edward I	1272
Edward II	1307
Edward III	1327
Battle of Crécy	1346
The Plague	1349
Battle of Towlers	1356
Richard II	1377
Henry IV	1399
Henry V	1413
Battle of Agincourt	1415
Henry VI	1422

land but *King of Great Britain and Ireland*. The remaining rulers of this list, therefore, bear that longer title:

George I . . . 1714-1727	Victoria . . . 1837-1901
George II . . . 1727-1760	Edward VII . . . 1901-1910
George III . . . 1760-1820 1910
George IV . . . 1820-1830	George V . . . 1910-1936
William IV . . . 1830-1837	Edward VIII . . . 1936-

The rulers are treated in separate articles under their proper headings.

At William's death in 1087 his second son came to the throne as William II, and he was followed on his death in 1100 by his younger brother Henry. Henry's reign was much disturbed by the attempts of Robert, Duke of Normandy, eldest son of William I, to gain the throne, but Henry was able to strengthen his hold on the kingdom and even to gain possession of Normandy. Henry had chosen as his successor his daughter Matilda, wife of Geoffrey Plantagenet, Count of Anjou, but Stephen, a grandson of William the Conqueror, raised an army in Normandy and attempted to seize the throne. After years of fighting with varying results it was agreed that Stephen should reign until his death, and that he should accept as his successor Henry, the son of Matilda. Stephen lived but a year after this arrangement was made, and in 1154 Henry, the first of the Plantagenets, came to the throne as Henry II.

Henry II proved to be one of the strongest of English kings. He put down the great barons who had established themselves in their castles and made themselves scourges to the country about them, and he established a just and orderly government. One of the most important events of his reign was his contest with the Church, the powers of which, despite his enforced submission to the Pope after the murder of Becket, he very materially lessened. Henry, whose possessions in France exceeded in extent his English kingdom, had spent little of his time in England, and his son, Richard I (1189-1199), who succeeded him, was in England only one year during his reign. In his absence the nobility succeeded in increasing their power at the expense of the royal authority.

John (1199-1216), who succeeded Richard, while in some ways an able man, was untrustworthy and weak, and during his reign England lost all of its possessions in France. This separation of the two countries in the end worked good to England, as it compelled the Norman barons in Eng-

land, who up to this time had thought of France as their home country, to recognize themselves as subjects of an English king. John's weakness was beneficial to England in another way, because it allowed the barons, with the support of the people, to wrest from him the Great Charter of Liberties. John's son, Henry III (1216-1272), succeeded him, and much of this reign was taken up with troubles with the barons, which in the end resulted in a confirmation of the Great Charter. It was during this reign that the first House of Commons was assembled.

Edward I (1272-1307) proved himself a stronger king than his two predecessors and reduced the country to order. It was in his reign that Wales was finally united with England, and that the fierce struggle with Scotland began, which continued, at intervals, for centuries. Edward, by his defeat of William Wallace, gained some advantage in Scotland, but under Edward II this was lost, and after the victory of Robert Bruce at Bannockburn in 1314, the independence of Scotland was recognized. With Edward III (1327-1377) began the long struggle with France known as the Hundred Years' War. Edward, with his son, the Black Prince, won brilliant victories, which, however, meant no permanent advantage for England, while the great expense of the war was a serious drain on the country. Two important results of the contest to England were the strengthening of the national feeling, which resulted from the union of the Normans and Saxons against France, and the increased power which Parliament secured because Edward III was dependent upon it for supplies.

Richard II (1377-1399) proved but a weak king, and after several uprisings, chief of which was the insurrection under Wat Tyler, he was dethroned by Henry, Duke of Lancaster, who came to the throne as Henry IV. The persecution of the Lollards and the frequent rebellions headed by supporters of the deposed king, Richard, were the chief events of this reign, which, however, was of importance in the growth of constitutional government in England by reason of Henry's respect for the authority of the Parliament which had proclaimed him king. The reign of Henry V (1413-1422), was spent chiefly in the prosecution of the Hundred Years' War, and so successful were the English that Henry was able to wring from the French

England Under the Stuarts



KING JAMES I

THE
STUART



QUEEN ANNE

THE
LAST
STUART

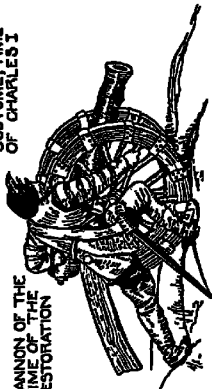


COSTUME, TIME
OF
CHARLES I



OFFICER'S HELMET

CANNON OF THE
TIME OF THE
RESTORATION



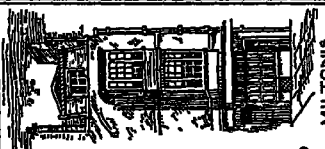
HOUSE
ON FIRE
PERIOD



CHARLES I



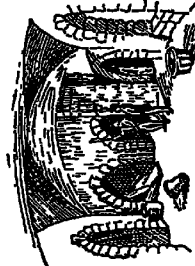
EIGHTEENTH CENTURY CHAIR



MILTON'S
HOME

NOTED WRITERS
OF THE PERIOD

SHAKESPEARE
BACON
JONSON
RALEIGH
MILTON
BUNYAN
DRYDEN
DEFOE
SWIFT
ADDISON
BUTLER



VAULT BENEATH THE HOUSE OF LORDS
ASSOCIATED WITH THE GUNPOWDER PLOT



ENTRANCE TO
CELL OF
SIR WALTER RALEIGH
IN
WHITE TOWER



WILLIAM AND MARY

CHRONOLOGICAL SUMMARY

1603	ACCESSION OF JAMES I
1605	GUNPOWDER PLOT
1606	ACCESSION OF CHARLES I
1629	EXECUTION OF CHARLES I
1649	COMMONWEALTH FOUNDED
1653	CROMWELL BECAME PROTECTOR
1658	DEATH OF CROMWELL
1660	ACCESSION OF CHARLES II
1666	PLAGUE AND FIRE AT LONDON
1688	ACCESSION OF WILLIAM III
1689	ACCESSION OF MARY II
1689	ACCESSION OF ANNE
1707	UNION OF SCOTLAND AND ENGLAND

king, Charles VI, a promise that the English king should succeed him on the throne of France. After the death of Henry V and the succession of his son, Henry VI, who was but a boy, the French, with the aid of Joan of Arc, defeated the English and obliged them to relinquish their claims on France.

In the reign of Henry VI (1422-1461), began the long factional struggle known as the Wars of the Roses. In the course of these wars Henry VI was several times dethroned and again restored, but ultimately Edward IV, the head of the House of York, firmly established his hold on the throne. After the short reign of Edward V, which was a reign in form only, Richard III usurped the power, but he was overthrown in 1485 at the Battle of Bosworth, and Henry, Earl of Richmond, came to the throne as Henry VII. He was the first of the Tudor dynasty. The new king was a man of ability, and he successfully upheld the royal authority, at the expense of Parliament and the nobles, so that his son, Henry VIII (1509-1547), found himself, at his accession, in the possession of great power.

The reign of Henry VIII was chiefly noteworthy for the beginnings of the Reformation in England (see REFORMATION; HENRY VIII), which arose not through any desire of Henry's to found a new ecclesiastical system, but from a contest of the king with the Pope on a personal matter. Edward VI (1547-1553), Henry's son, carried on the work of the Reformation, but on the accession of Henry's daughter Mary (1553-1558), the most strenuous efforts were made to restore the Catholic religion. Cranmer, Ridley and Latimer were the most illustrious of the many victims of this attempt to crush out the Reformation in England. Mary's efforts, however, were in the end vain, as her half-sister, Elizabeth (1558-1603), on her accession reestablished the reforms which her father had instituted, and by the Act of Supremacy had herself proclaimed head of the Church in England. One important result of this move of Elizabeth's was the increase in the feeling of nationality in England, and this growth was also promoted by the defeat of the Armada. During Elizabeth's reign Ireland was entirely reduced to dependence on England.

When Elizabeth died, James VI of Scotland, son of Mary Queen of Scots, succeeded

her on the throne as James I, and established in England the Stuart dynasty. Despite this union of the crowns of the two countries, a complete union was not accomplished for over one hundred years. At the outset of his reign, James, by his statement of the doctrine of the "divine right of kings," instituted a controversy with Parliament which ended disastrously for his son. This reign is noteworthy in the history of America, because during it were founded the colonies in Virginia and in Massachusetts.

Almost immediately after the accession of Charles I (1625-1649), the struggle with Parliament reached a crisis. Charles prorogued his first two Parliaments, and although he was compelled by the Parliament which convened in 1628 to assent to the Petition of Right, he assembled no Parliament for eleven years after that time and ruled almost as arbitrarily as Louis XIV of France. The persecutions of the Puritans, the attempt to force the Anglican liturgy on the Scottish Church and the continued disregard of the necessity of calling a Parliament finally brought matters to a head, and when, in 1640, Charles did assemble a Parliament, because he found that he must have its aid in putting down the risings in Scotland, Parliament took matters into its own hands and impeached the king's ministers.

The contest soon led to open war. After several years of varying fortunes the war ended in the defeat of Charles, who gave himself up to the Scottish army. He was handed over to the English Parliament and in 1649 was tried, convicted of treason and put to death. The strongest man in Parliament and in the army, Oliver Cromwell, soon showed himself the natural head of the country, and he was able by 1653 to make himself Lord Protector of the commonwealth and to rule almost absolutely until his death in 1658. Cromwell's son proved but a weak successor, and by 1660 the royalists were able to bring about the restoration of Charles II, who was most enthusiastically greeted on his return to England. This reign (1660-1685), during which in its foreign policy England was little more than a dependency of France, and the court and society were more licentious than at any other period of English history, passed without any serious protests against the arbitrary character of Charles, so glad were the people to have again a king of the royal line.

Before the death of Charles, attempts were made to exclude from the succession his brother, James, because he had adopted the Roman Catholic religion, but these proved unsuccessful, and James succeeded to the throne without a struggle. The pronounced favor which he showed to Catholics, his setting aside of the Test Act, his proclamation of a declaration of indulgence and, finally, in 1688, the birth of a son who, it was feared, might be trained in the Catholic religion and might continue his father's policy, led many of the great nobles of the country to dispatch an invitation to William and Mary, the son-in-law and daughter of James, to accept the English throne. On their landing, late in 1688, James fled, and William and Mary were proclaimed sovereigns without striking a blow.

During William's reign the Dissenters were allowed freedom of worship, and a step was taken in the direction of true constitutional government, by the declaration of the responsibility of the king's ministers to Parliament. In foreign affairs the reign was taken up largely with the struggle with Louis XIV of France, and William died just when he had begun preparations for another struggle with Louis. Anne (1702-1714) continued his plans, and her reign was made brilliant by the successes of Marlborough in the War of the Spanish Succession. It was during the reign, in the year 1707, that the legislative union of England with Scotland was finally accomplished. England's history since that date is related in the article **GREAT BRITAIN**.

Other Facts. Information regarding the transportation and commerce, government and religion of England will be found under appropriate subheads in the article **Great Britain**. English art is discussed under the headings **Painting** and **Sculpture**, and the language and literature under the titles **English Language and Literature**, subhead **English Literature**.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Aldershot	Helifax
Avon (river)	Huddersfield
Birmingham	Hull
Blackburn	Kenilworth
Bolton	Leeds
Bradford	Land's End
Brighton	Leicester
British Empire	Lincoln
Canterbury	Liverpool
Channel Islands	London
Chester	Manchester
Coventry	Mersey (river)
Derby	Newcastle-upon-Tyne
Dover	Norwich
English Channel	Nottingham
Exeter	Oxford
Gloucester	Plymouth
Greenwich	Portsmouth

Sheffield
Southampton
Stratford-on-Avon
Thames (river)

Trent (river)
Yarmouth
York

HISTORY

Anglo-Saxons	Hastings, Battle of
Armada	Hundred Years' War
Bannockburn	Lancaster, House of
Barbones Parliament	Long Parliament
Boyne, Battle of the	Magna Charta
Cavaliers	Normans
Church of England	Petition of Right
Commonwealth of England	Plantagenets
Crecy	Reformation, The
Crusades	Renaissance
Domesday Book	Roses, Wars of the
Feudal System	Ryswick, Treaty of
Field of the Cloth of Gold	Tower of London
Gunpowder Plot	Tudor
	Witenagemot
	York, House of

BIOGRAPHY

Alfred the Great	Harold I
Bruce, Robert	Joan of Arc
Canute	Latimer, Hugh
Cromwell, Oliver	Mary Stuart
Edward, the Confessor	Montfort, Simon de
Edward, the Black Prince	Raleigh, Sir Walter
	Tyler, Wat
	Wallace, William

ENGLAND, CHURCH OF, the State Church of England. Christianity was established in England in the sixth century through the efforts of Saint Augustine, and until the Reformation the English Church was a branch of the Roman Catholic. The present organization dates from the reign of Henry VIII, who was responsible for the struggle which resulted in the abolition of Papal authority in England. Henry was made the supreme head of the Church and at the time contemplated no change in doctrines and no separation into rival communities. However, the king dissolved the monasteries and expended the treasures of the Church on himself and court. These high-handed measures retarded any reform movement that might have been made and caused a general discontent, not only among the officials but among the communicants of the Church. During the reign of Edward VI the influence of the Reformation was strongly felt in England, and there were many men who sympathized with Luther, Calvin and other leaders of that movement; England probably would have become Protestant at that time had not the king been succeeded by Mary, who was a Catholic. During her reign there was a strong reaction. During the reign of Elizabeth, however, there was a final separation from the Papacy, and the Thirty-nine Articles (see **ARTICLES, THE THIRTY-NINE**) were put in their present form.

There are three more or less distinct parties in the Church, known as the *High Church*, *Broad Church* and *Low Church*.

High Church adherents are nearest the Roman Catholics in forms of worship and belief; the Low Church advocates simplicity in worship and is opposed to Ritualism. Between these is the Broad Church group.

The ecclesiastical law of England is very simple. There is no formal constitution, but the Church is governed by about 150 canons. Parliament with the sovereign may impose any law on the Church. Convocations are called for the purpose of considering ecclesiastical subjects. The country is divided into two provinces, Canterbury and York, with an archbishop in each, the Archbishop of Canterbury being the primate of all England. Each province is divided into dioceses, over which are bishops. Next to the bishops in order of rank are the archdeacons and deans, followed by canons, prebendaries, rectors, vicars and curates. Many of the churches have large endowments, and the support of their clergy is entirely independent of the congregation. The Church maintains effective missionary societies and other auxiliary organizations and has missions in various parts of the world. The corresponding organization in America is the Episcopal Church (which see).

ENGLISH CHANNEL, the arm of sea which separates England from France. It extends on the English side, from Dover to the Land's End, and on the French, from Calais to the Island of Ushant. It is twenty miles wide at its narrowest point and 140 miles wide at its widest point. The French call it *La Manche*, meaning *the sleeve*. The Seine is the only important river that flows into it. The Isle of Wight and the Channel group are the principal islands in the Channel, and the chief ports are Plymouth, Falmouth, Southampton, Portsmouth, Brighton and Dover, in England, and Cherbourg, Havre, Dieppe, Boulogne and Calais, in France. The Channel is noted for its roughness, for windstorms on it are frequent, and it is the meeting place of opposing currents from the Atlantic and the North Sea.

During the World War this arm of the sea became a transportation route of supreme importance, as it was the route followed by countless ships bearing men and supplies from England to France. The great German drive for the Channel ports in the spring of 1918 would, if successful, have given the central powers command of the Channel and multiplied the burdens of the allies. It is

possible that some day England and France will construct a tunnel beneath the Channel; the project has long been discussed.

ENGLISH LANGUAGE, the language spoken by the people living in the British Isles and the United States and in the most of their possessions and colonies. The foundation of this language is the speech of the ancient Angles and Saxons, who separated themselves from their Teutonic brothers in the north of Europe and crossed to England in the fifth and sixth centuries A. D. They found here the Britons, speaking a Celtic dialect; and though, after one hundred fifty years of hard and incessant fighting, they succeeded in driving the natives to the north and west, that ancient language has persisted through the intervening centuries and a survival of it is found to-day in Wales.

The simple, strong and forceful words of the English language come from the Anglo-Saxon. The highly inflected Anglo-Saxon language was little modified until the Norman Conquest, when French was made the language of the court and of law. The English people would not accept this new speech, and for two hundred years two languages with many dialects were spoken in this little island. About 1250 there began an amalgamation of the two tongues. At the same time the complicated inflections began to be dropped. In less than two hundred years a new language was taught in the schools and heard in the courts of law. This language was for the most part the English heard to-day.

Of this new composite language, the Anglo-Saxon had furnished the common words of the home, the farm and every-day life; while the Norman had introduced the words that pertained to the court, society, sports and law. Under the Italian influence, which lasted from 1400 to 1660, many more words of Latin origin were incorporated into our speech. The recent developments in science have brought a large influx of technical terms, generally derived from the Latin and the Greek. So in thirteen or fourteen centuries an Anglo-Saxon vocabulary of possibly 30,000 words has expanded into the rich and full English language of more than 500,000 words, of which a large majority have been adopted from foreign tongues. Yet the grammar of our language and the vocabulary of our common speech are in the main still the vigorous Anglo-Saxon.

Related Articles. Consult the following titles for additional information.

England (history)	Literature, subhead
Language and Grammar	English Literature
Language, Methods of Teaching	Philology

ENGLISH LITERATURE. See **LITERATURE.** Subhead *English Literature*.

ENGRAVING, the art of cutting characters or designs on a hard surface. This broad definition may include such examples as the figures cut on the rock walls of the prehistoric cave-dwellers; but in common usage the term is applied to the fine art of cutting designs upon metal plates or blocks of wood from which many impressions may be made. Sometimes the impression printed from this surface is called an engraving, but more properly it is designated a print.

The earliest engraving for the purpose of printing originated with the Chinese, who, as early as the tenth century, printed from wooden blocks. The art of printing from engraved plates of metal was discovered by an Italian in the fifteenth century, and by the middle of that century it was quite common in most of the countries of Europe. Some of the most celebrated artists of the fifteenth and sixteenth centuries reproduced their works by the use of engraved metal plates. In the latter part of the seventeenth century the art was introduced into England. Before photography was invented, engraving was about the only means of reproducing the works of artists. To-day except for special purposes, such as the printing of bank notes and fine copies of pictures, engraving is displayed by halftone printing and zinc etching.

A metal plate to be engraved must be free from scratches and must be highly polished. Over it is spread a thin layer of gummy substance called a *ground*. The ground is smoked, and the design to be engraved is transferred to it. At this stage the etching needle begins to work. It is passed over the entire design, leaving in its track a fine line of bright metal where the ground has been scratched off. A corroding acid is then poured over the plate to eat out the metal along the lines thus laid bare. A small instrument called a graver, or burin, is then used to complete the work of the acid. This is a short steel bar with a sharp, triangular point. When this tool is pushed along the surface of a metal plate with the axis of the bar slightly inclined to the plate, it plows

up the metal in a curled shaving making a groove. The pressure upon it determines the size of the groove and the heaviness of the line that will be produced in the printing. The graver in going over the acid-bitten plate connects broken lines, strengthens weak ones and, with the aid of a burnisher, gives perfection and finish. Such is the process for landscape engraving.

In historical and portrait engraving of the highest class, the lines are first drawn on the metal with a fine point and are then entirely cut in by the graver. In soft-ground etching the ground is made by mixing lard with common etching ground and is laid on the plate and smoked as before, but its extreme softness renders it liable to injury. Therefore the outline of the subject is drawn on a piece of rough paper larger than the plate, the paper is dampened and laid gently over the ground, face upward, and the margins are folded over and pasted down on the back of the plate. When the paper is dry and taut a bridge or hand rest is laid across, and with a hard pencil the artist draws his design. The pressure makes the ground adhere to the back of the paper at all points touched by the pencil, and when the paper is lifted off, these parts of the ground are lifted with it. The corresponding parts of the plate thus left bare are subsequently exposed to the action of the acid. The irregular surface of the paper causes similar irregularities on the ground, and gives to the impression the character of a chalk drawing. The biting-in is effected in the same manner as already described, and the subject is finished by rubbing and working with the graver.

Wood Engraving. Wood engravings are made on a slab of very hard wood, such as Turkish boxwood. The surface to be engraved is on the across-grain of the wood, and is made smooth with pumice and polished. Sometimes the design is drawn on the block, but more frequently it is transferred by means of photography.

The wood engraver's tools are delicate and are made of the finest steel. They are much like the wood carver's tools, and include gouges, chisels, dividers, in all sizes. If a slip of the knife is made, a hole is bored in the block where the tool slipped, and a plug of wood is inserted. Before the engraver begins cutting out the design, he gums a piece of paper over the sketch or

photograph and tears out a hole over that part of the work where he begins engraving. The paper keeps the hand and fingers from smudging the drawing, and as the work progresses he enlarges the hole. After the job is finished a proof is taken under a hand press, and if it is satisfactory the woodcut is sent to the electrotypier, as the printing is not done from the woodcut, but from electrotypes of it.

Related Articles. Consult the following titles for additional information
 Aquatint Halftone
 Electrotyping Printing
 Etching Zinc

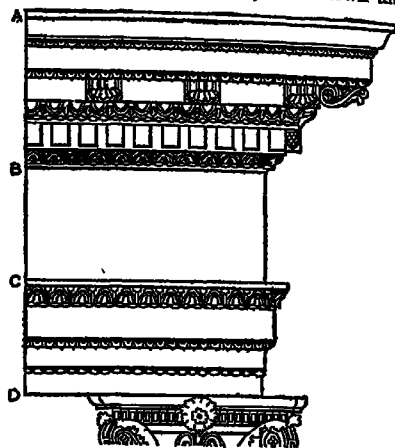
ENID, OKLA., the county seat of Garfield County, fifty-five miles northwest of Guthrie, on the Frisco, the Santa Fé and the Chicago, Rock Island & Pacific railroads. The airport is Woodring Field. The city is located in a fertile farming country, especially productive of wheat, poultry, eggs, butter and cream. In the last four products Enid leads all other parts of the country of equal area. Alfalfa is also a leading crop. There are excellent shipping facilities, and several wholesale houses conduct an extensive trade. There are large flour mills, a packing plant, an oil refining plant, a brick plant, manufactures of corn seeders, ice, artificial stone, candy and other factories. The courthouse is a fine structure as is also the Federal building. The city has Phillips University, Saint Francis Institute, a Carnegie Library and well equipped hospitals. The commission form of government is in force. The city dates from 1893. Population, 1930, 26,399.

ENSIGN, *en'sine*, a term used with two different meanings. It signifies the flag of a nation, and is also the rank of the lowest commissioned officers in the United States navy. These are graduates of the Naval Academy at Annapolis, and correspond in rank to second-lieutenants of the army. The pay is \$1,700 a year for the first five years, and an increase of ten per cent after the fifth year of service. Until 1871 the lowest commissioned officers in the British army were called ensigns.

ENSILAGE. See **SILLO AND SILAGE.**

ENTABLATURE, in classic architecture that part of a building which rests upon a row of columns. It consists of three principal divisions, the *architrave*, the part immediately above the column; the *frieze*, the central space, and the *cornice*, the upper pro-

jecting moldings. In large modern buildings, projections similar to, and known also



ENTABLATURE

AB, cornice, BC, frieze, CD, architrave

as, entablatures are often carried round the whole edifice, or along the front of it. See **COLUMN**; **PARTHENON**.



ENTERTAINING, SUGGESTIONS FOR. "What shall I do to entertain my guests?" This question presents itself frequently to large numbers of people; therefore, the following outlines ought to prove timely and helpful. These suggestions are of a varied nature; there is material for those whose guests enjoy competition in mental alertness, and for those whose guests prefer physical relaxation. A good many of the games can be modified, if it seems advisable, to adapt them particularly to individual needs.

Revealing Answers. One of the players goes out of the room and those remaining select the name of a well-known song. The person who is to guess this name is then called in and is told to ask the various players certain questions. Each answer must contain some word in the first line or the first stanza of the song. (This point depends upon the number of players, the length of the lines, and the preference of the

players as to how difficult the game is to be made) For example, suppose the song "Old Oaken Bucket" is selected The answers must contain the words *heart, scenes, childhood, etc.*

Revealing Syllables. This is a variant of the preceding game. Each of the players is given one syllable out of a specified line, which he must sing to a selected tune The syllables are all sung at the same time, and the one guessing the song must endeavor to distinguish them and to piece them together If *America* is chosen, the players will all be singing together, but one will sing only *my*, another *coun*, another *try*, etc The syllable may be sung in regular rotation, or otherwise, as the players prefer.

Descriptive Initials. Each of the following expressions suggests the name of an individual prominent within recent years The initial letters of the words in any description are the initials of the person described The hostess may write the descriptions on cards and pin one on each guest. The guests are then provided with slips of paper, and pencils, and directed to write down the names as they guess them Have the cards numbered.

DESCRIPTION	KEY
1 Whaled John Barleycorn	William Jennings Bryan
2 Found Cheating	Frederick Cook
3 Thoroughly Energetic.	Thomas Edison
4 Made Fortunes . . .	Marshall Field
5 Handles Flivvers . . .	Henry Ford
6 Great Commoner . . .	Grover Cleveland
7 Registers Exceptional Bravery	Richard Evelyn Byrd
8 Reached Pole . . .	Robert Peary
9 Movie Princess . . .	Mary Pickford
10 Justly Promoted	John Pershing
11 Nationally Rejected	Nicholas Romanoff
12 Thundering Reformer	Theodore Roosevelt
13 Greatest British Satirist	George Bernard Shaw
14 Explored Southward	Ernest Shackleton
15 Frankly Demanded Reform	F D Roosevelt

Write a Telegram. This game calls for a number of telegraph blanks, if they can be obtained; of course, an ingenious hostess can easily make imitation ones. Each blank has written on it ten letters, and each player is directed to compose a telegram using words beginning with the letters. A prize may be given for the most original. For example, the person having the letters B S F S C T O R A H might write: "Burglars stole father's shoes; catch train or ride a horse."

Acting Charades. Competing sides are chosen and each side in turn acts out for the opponent a word of several syllables The side which guesses the most words is declared the winner. For instance, if *mantel-piece* be chosen the first two syllables may be represented by someone who tells a story about a man. *Piece* can easily be acted out, and lastly the entire word. There are a large number of words that lend themselves to portrayal of this sort, and charades are excellent material for sharpening the wits Some suggested words follow: Windlass, necromancer, children, Washington, silent, mistletoe, mendicant, handicap, inspiration, instrumental, laundress.

The charades which follow may be read aloud or be written on slips of paper and passed around to be guessed They are not acting charades, as may be seen. Puzzles of this sort may be used to good advantage at a luncheon, before the guests leave the table.

Hidden Names of Flowers. Each of the following may be written on sheets of paper or, better, may be typewritten and passed to the guests for solution:

- My first and second are each a lady's name,
My third an exclamation
My fourth is a part of the human frame,
My whole a spring donation
- My first plus my second's a gift from the Lord,
And comes every day with the light
My third plus my fourth is the victor's reward
My whole goes to sleep every night
- My first enjoys the morning sun
And trills a song on high
My second makes the horses run,
My whole is like the sky
- My first two form a lady's name,
Borne by queens well known to fame
My third describes a metal rare,
Adorning many a lady fair
My whole, a flower of yellow hue,
Opens its eyes in morning's dew
- In days of old my first came forth,
And preached on Jordan's shore
In later days my last was used,
But now 's used no more
You'll find my whole a jolly fellow,
Dressed in a coat of brightest yellow

KEY		
1 An em o ne	2 Larkspur	5 Jonquill
2 Morning glory	4 Marigold	

The Minister's Cat. A certain letter in the alphabet is selected and each player must think of an adjective beginning with that letter, to apply to the minister's cat The players describe the animal in rotation, as

follows: The minister's cat is a *little* cat; a *laughing* cat; a *lean* cat, etc. No word may be used more than once, and the winner is the one who can stay in the game longest, thus disclosing ability to name the greatest number of adjectives.

Geographical Game. The person starting the game uses a sentence containing some geographical word, as "I live in America." The next player must use a sentence containing a term beginning with the last letter in *America*, as "I crossed the Atlantic." The third player gives a sentence containing a word beginning with "C," and so on. No geographical term may be repeated, and those who make mistakes or cannot think of a term drop out of the game.

John Brown's Body. This is a nonsense game that is sure to create much laughter. The players sing in unison the chorus "John Brown's body lies a mould'ring in the grave." The first time they sing the four lines entire. The second time they sing all but the first word, *John*; instead of singing that word they nod the head. The next time they give two nods and begin with the word *body*, and so on through the song.

Old Mrs. McKinsey is Dead. This is another nonsense game. The first player says to his right-hand neighbor, "Old Mrs. McKinsey is dead." "How did she die?" asks the second player. "This way," and player number one waves his right hand back and forth. The answer and question go round the circle, and each player keeps his hand waving. Then number one begins again, and when asked how the old lady died, waves his left hand. This also goes round the circle. The third time the leader nods his head, the fourth time he shakes a foot, and so on. The game can be kept up as long as the players wish. After a number of rounds the players usually have to stop because they are exhausted with laughter.

Elementary Elocution. Each of the players is given a slip with the name of a Mother Goose jingle written on it. As their names are called each player mounts a chair and delivers, as dramatically as possible, the rhyme assigned him. This affords good opportunity for mock heroics and plenty of fun. Prizes may be given for cleverness of interpretation. A variant of this idea is to have familiar songs, especially comic ones, sung in grand opera style.

Acted Music. Those who possess phono-

graphs can entertain their guests in a somewhat unusual way by having various selections acted out. Certain persons must be chosen beforehand and drilled. For example, someone may dress up as a grand opera *prima donna* and go through all the motions of singing while the phonograph is rendering the aria. Sousa's marches may be conducted by a person imitating the "March King." There are many other stars who can be represented.

A Dress-up Affair. This is a contest in getting into and out of garments quickly. Each of the guests brings with her a suitcase filled with a specified number of non-descript garments. The cases are passed around later, so that no one may know what the one given to her contains. At a given signal the cases are opened, and each player puts on, exactly in the order in which she touches them, the garments in the case. As soon as she has used them all she must take them off again, pack them in her suitcase, and close it. The one who finishes first is the winner. The ridiculous appearance of the players gives an added element of fun.

Who Am I? This is an excellent game to play when there is a large number of guests and the hostess wishes them to get acquainted with one another. A slip bearing the name of a noted person is pinned on the back of each guest, and as the guests circulate about they ask one another "Who am I?" The answers may suggest the names on the slips, but must not inform the questioners outright.

Miscellaneous Guessing Contests. A number of contests follow which will test the ingenuity of the players. The hostess in most cases should write out the exercises on slips of paper and have the guests write the answers. Prizes may be given for accuracy and originality.

A Missing Song Romance. Write out the following questions and leave blank space for the answers. As each question is read someone at the piano plays a strain of the song to be guessed. The title of the song in each case is the answer to the question.

1. What was the hero's name? *Ben Bolt.*
2. What was his sweetheart's name? *Annie Laurie.*
3. What made him become a soldier? *The Battle Cry of Freedom.*
4. For what did he offer his life? *America and Home Sweet Home*

5. When did he come to say good by? *In the Gloaming.*
6. Who opened the door for him? *Old Black Joe.*
7. What did the heroine offer the hero? *The Vacant Chair.*
8. What did he bring her? *Flowers that Bloom in the Spring.*
9. How did her voice sound as she thanked him? *Sweet and Low.*
10. What did he say to her? *How Can I Leave Thee?*
11. What did she promise to do? *Keep the Home Fires Burning*
12. What were her last words to him? *"Good By, My Lover, Good By."*
13. What kind of a watch did he promise to seek? *Watch on the Rhine.*
14. Where was he in a few weeks? *Tenting on the Old Camp Ground*
15. When did he think of her? *Oft in the Stilly Night*
16. What did he say when they asked him whom he was thinking about? *The Girl I Left Behind Me and Old Folks at Home*
17. What did he sometimes sing? *Love's Old Sweet Song.*
18. What appeared on her head as she waited at home? *Silver Threads Among the Gold*
19. What always floated over her home? *The Star-Spangled Banner.*
20. What was the motto of both? *The Stars and Stripes Forever!*

A Bouquet of Well-known Flowers When Jack was a small boy his mother decided to educate him for the ministry, because, so she said, she wanted to see . . 1. . some day. She was very strict with him, and when he was disobedient she punished him with a . . 2. . That used to make him . . 3. . Jack called his father . . 4. . and his good-natured brother Bill he nicknamed . . 5. . His sister Sue he called . . 6. . because she had such dark eyes Jack's mother told him that if he wanted his health to be . . 7. . he must get up at . . 8. . in the morning. So when his father called . . 9 . he always . . 10. . at once. As Jack grew up his mother thought he ought to find him a wife She said, "I hope you will not . . 11. .; I would rather see you . . 12. . in . . 13. . with a poor girl"

One day Jack met a pretty maid named Rose, whom he loved at first sight So he . . 14. . to marry him. He said ". . 15 me

I lay my . . 16. . at your feet" But she was a . . 17. . and she replied ". . 18. . ." But after he had asked her many a . . 19 . she finally consented to be his . . 20. . That evening in her parlor they drew down the . . 21 . and he kissed her . . 22 . When he went home each said to the other ". . 23. . ." They were soon married, and she urged him not to become a mere . . 24. . of society. Some people . . 25. . anything, but he remembered her words, and though he met many foreign belles he remained true to his . . 26. .

KEY

- | | | |
|-----------------------|-------------------|--------------------|
| 1 Jack-in-the-pul-pit | 9. Johnny-jump-up | 18 Touch-me-not |
| 2 Lady's slipper | 10 Rose | 19 Thyme |
| 3 Balsam | 11 Marigold | 20 Heartsease |
| 4 Poppy | 12 Livefor-ever | 21 Night-shades |
| 5 Sweet William | 13 Sweet peas | 22 Tulips |
| 6 Black-eyed Susan | 14 Aster | 23 Forget-me-not |
| 7 Everlasting | 15 Rosemary | 24 Dandelion |
| 8 Four-o'clock | 16 Bleeding heart | 25 Lilac |
| | 17 Primrose | 26 American Beauty |

Hidden Names of Birds My son Bill came into the house one day looking very angry and so out of breath that he was . . 1. . "Why are you so . . 2 .?" I said ". . 3. . rather see you happy." "Well," said Bill, "I was out by the brook sitting on a . . 4 . and along came Ern Jones 'Do your . . 5. .,' I said, 'and let's catch some fish.' So we sat down together, and after awhile we began to . . 6 . But I . . 7. . if he didn't try to . . 8. . all over me, telling me he was the . . 9. . of the neighborhood, and it was a . . 10. . to beat anyone. Now, I couldn't . . 11. . all of his . . 12 . and I told him he was . . 13. . me of my just deserts. Ern is a . . 14. . fellow and before I could . . 15. . or . . 16. . my head, he hit me So we had a fight and here I am" When I had heard Bill's story I scratched my . . 17. for I have little . . 18. . my head, and decided not to . . 19. . for fighting. If a boy treated me that way I . . 20. . him into the brook.

KEY

- | | | |
|-------------|--------------|-------------------|
| 1 Puffin | 8 Crow | 15 Tern |
| 2 Crossbill | 9 Kingfisher | 16 Duck |
| 3 Elder | 10 Lark | 17 Baldpate |
| 4 Rail | 11 Swallow | 18 Heron |
| 5 Bittern | 12 Raven | 19 Whip-poor-will |
| 6 Chat | 13 Robin | 20 Wood-duck |
| 7 Swan | 14 Swift | |

State Guessing Contest In the following exercise the answer to each question is the abbreviation of one of the states of the Union:

1. What state has never married?
2. What state needs a physician?
3. What is the degree of that physician?

4. What state is useful in haying time?
5. What state is very exclamatory?
6. What state is busy on Mondays?
7. What state has a shelter in time of rain?
8. What state is dear to the Mohammedans?
9. What state can never be you?
10. What state is very pious?
11. What state never says "can't"?
12. What state uses the decimal system?
13. What state sells gold bricks?
14. What state could go out rowing?
15. What state is daddy to them all?

KNY

- | | | |
|----------|----------|-----------|
| 1. Miss. | 6. Wash | 11. Kan. |
| 2. Ill. | 7. Ark | 12. Tenn. |
| 3. Md. | 8. Ala. | 13. Conn. |
| 4. Mo. | 9. Me | 14. Ore |
| 5. C. | 10. Mass | 15. Pa |

A *Catechism on Authors*. In each case the author's last name suggests the attribute applied to him:

1. What author is the most helpful?
2. What author is the best digger?
3. What author is the best shoe polisher?
4. What author hurts a man the most?
5. What author is the most aristocratic servant?
6. What author is the hottest?
7. What author is the best barrel maker?
8. What author is the sourest?
9. What author is the shrewdest?
10. What author is the most like our first ancestors?
11. What author is the healthiest?
12. What author is the most enduring?
13. What author is the heartiest?
14. What author is the best fisherman?
15. What author cries the hardest?
16. What author is the meekest?
17. What author is the tallest?
18. What author is the most foppish?
19. What author is the fairest?
20. What author is the most uncertain?
21. What author is the loudest?
22. What author suffers the most?
23. What author is the saintliest?
24. What author is the most bookish?
25. What two authors are farthest apart?
26. What author is the most scornful?
27. What author is the hardest?
28. What author is the strictest?
29. What author is most likely to win a race?
30. What author sews the best?
31. What author has the least repose?

KNY

- | | |
|--------------------|-----------------------|
| 1. George Ade | 17. Henry W. Long- |
| 2. John Burroughs | 18. fellow |
| 3. Richard Black- | 19. Richard Lovelace |
| 4. John Bunyan | 20. John Lyly |
| 5. Samuel Butler | 21. Hamilton Wright |
| 6. Robert Burns | 22. Mable |
| 7. James Fenimore | 23. Alfred Noyes |
| 8. Cooper | 24. Thomas Paine |
| 9. George Crabbe | 25. Alexander Pope |
| 10. John Fox | 26. Charles Reade |
| 11. Edward Gibbon | 27. Christopher North |
| 12. Edward B. Hale | 28. and Robert |
| 13. Thomas Hardy | 29. Southey |
| 14. Bret Harte | 30. Bernard Shaw |
| 15. Thomas Hooker | 31. Richard Steele |
| 16. William Dean | 32. Lawrence Sterne |
| Howells | 33. Jonathan Swift |
| | 34. Bayard Taylor |
| | 35. Oscar Wilde |

Hidden Names of Authors. In each instance the name of the author is suggested in the text.

1. The places we should like best of all to be
2. A precious metal and a worker in metal.
3. The seat of our affections
4. The penalty for wearing shoes that pinch
5. To agitate a weapon
6. To injure and the opposite of high.
7. The man who takes your measure
8. The things that languages are made of, and a man's character.
9. A name applied to prohibition advocates, and a refuge for wild beasts
10. A lizardlike animal and a preposition.
11. A domestic animal and what it cannot do
12. What the bread is doing in the oven
13. A fuel and something under which it is often found
14. A vehicle and a popular kind of hosiery
15. The opposite of an old fellow.
16. What a boy asks for when he gets one piece of candy

KNY

- | | | |
|--------------|------------|---------------|
| 1. Holmes | 7. Taylor | 12. Browning |
| 2. Goldsmith | 8. Words- | or Bacon |
| 3. Harte | worth | 13. Coleridge |
| 4. Bunyan | 9. Dryden | 14. Carlyle |
| 5. Shakes- | 10. Newton | 15. Newman |
| peare | 11. Cowper | 16. More |
| 6. Marlowe | | |

See **What You Can Do With "X"**. In the following exercise, add a word in each case to the prefix "ex," and get a new word (partly phonetic):

1. Add a division of a play and get a synonym for "precise"
2. Add loose coins and get a form of barter
3. Add an employee in a restaurant and get the treasury of a state
4. Add a homesteader's land and get what he does when he sees it
5. Add a telegram and get an edict of punishment from the Pope
6. Add a small island and get a wanderer
7. Add a pronoun and get a way out
8. Add a few cents and get something that demands more cents
9. Add a word meaning impudent and get a person of skill.
10. Add a coast city and get what is sent out of it
11. Add a printing machine and get a swift train.
12. Add a camper's shelter and get the limit of that shelter
13. Add nervous strain and get an addition
14. Add the end of anything and get its destruction.
15. Add a self-propelled farm implement and get a man that pulls teeth.
16. Add a story of legendary fame and get the fate of many criminals

KNY

- | | | |
|--------------|-------------|---------------|
| 1. Exact | 6. Exile | 13. Extension |
| 2. Exchange | 7. Exit | 14. Extermi- |
| 3. Exchequer | 8. Expense | nation |
| 4. Exclaim | 9. Expert | 15. Extractor |
| 5. Excom- | 10. Export | 16. Extradi- |
| munica- | 11. Express | tion |
| tion | 12. Extent | |

Who Are These Kates? The answer in each case is a word ending in *cate*

- 1 A Kate who will plead for you
- 2 A Kate who embezzles
- 3 A Kate who is often sick
- 4 A Kate who sometimes puts her shoulder out of joint.
- 5 A Kate who has a double
- 6 A Kate who knows how to teach
- 7 A Kate who takes out stains
- 8 A Kate who will help you out of difficulties
- 9 A Kate who tells falsehoods
- 10 A Kate who calls down Heaven's wrath upon you
- 11 A Kate whose actions are very puzzling
- 12 A Kate who prays with fervor
- 13 A Kate who pours oil on squeaky hinges
- 14 A Kate who chews her food well
- 15 A Kate who makes predictions
- 16 A Kate who was smothered
- 17 A Kate who points out
- 18 A Kate who left the premises

KEY

- | | | |
|-------------|-----------------------|------------------|
| 1 Advocate | 8 Extricate | 13 Lubricate |
| 2 Defalcate | 9 Fabricate | 14 Masticate |
| 3 Delicate | (or Pre-
varicate) | 15 Prognosticate |
| 4 Dislocate | | |
| 5 Duplicate | 10 Imprecate | 16 Suffocate |
| 6 Educate | 11 Intricate | 17 Indicate |
| 7 Eradicate | 12 Supplicate | 18 Vacate |

Naming the Nations. The answer in each case is a word ending in *nation*

- 1 The nation that adopts one of two courses
- 2 The nation that kills its public men
- 3 The nation in which the different parties unite
- 4 The nation that crowns its rulers
- 5 The nation that is blessed with magic insight.
- 6 The nation that contributes gifts
- 7 The nation that makes things clear
- 8 The nation that chooses candidates for office
- 9 The nation that installs clergymen
- 10 The nation that is bankrupt.
- 11 The nation that is sluggish
- 12 The nation that has no smallpox

KEY

- | | | |
|-----------------|---------------|----------------|
| 1 Alternation | 5 Divination | 9 Ordination |
| 2 Assassination | 6 Donation | 10 Ruination |
| 3 Combination | 7 Explanation | 11 Stagnation |
| 4 Coronation | 8 Nomination | 12 Vaccination |

Musical Mathematics. Subtract the last three letters from the names of well-known singers or composers and have left

- 1 A vehicle
- 2 An inhabitant of Heaven
- 3 The opposite of near
- 4 That which a river does
- 5 That which a traveler does
- 6 A pronoun applied to oneself
- 7 A pronoun applied to all of us
- 8 What an old-fashioned doctor uses
- 9 What scandal does to one's reputation
- 10 What a gossip's tongue does

KEY

- | | | |
|--------------|-----------|-------------|
| 1 Car-uso | 5 Gad-aki | 8 Herb-ert |
| 2 Cherub-ini | 6 Me-lba | 9 Sulli-van |
| 3 Far-rar | 7 We-ber | 10 Wag-ner |
| 4 Flo-tow | | |

Subtract the first letter from familiar musical terms and have left:

- 1 A sweet-toned musical instrument.
- 2 A vast mob of soldiers
- 3 An athletic contest
- 4 An ancient vase
- 5 A slang word for money.
- 6 A four-legged animal
- 7 A strong liquor used by sailors
- 8 The inmost part of an apple
- 9 A skin irritation
- 10 A swift means of traveling.
- 11 A source of water
- 12 A small brook
- 13 The opposite of new.
- 14 A child's toy

KEY

- | | | |
|----------|------------|-----------|
| 1 S-harp | 6 B-ass | 11 S-well |
| 2 C-hord | 7 D-rum | 12 T-rill |
| 3 B-race | 8 S-core | 13 H-old |
| 4 T-urn | 9 P-itch | 14 S-top |
| 5 S-oale | 10 S-train | |

Tree Guessing Contest. In this exercise the answer to each question is the name of a tree. The name in each case is suggested by the question:

- 1 What tree is a good harbor?
- 2 What tree is dear to Irish hearts?
- 3 What tree keeps all dressed up?
- 4 What tree is wasting away through grief?
- 5 What tree goes to fortune tellers?
- 6 What tree can make a horse laugh?
- 7 What tree can never be myself?
- 8 What tree is never younger?
- 9 What tree grows near the seashore?
- 10 What tree is opposed to prohibition?
- 11 What tree is feared by unruly boys?
- 12 What tree is the least handsome?
- 13 What tree wears a warm garment?
- 14 What tree is the father of the others?
- 15 What tree offers shelter in time of rain?
- 16 What tree likes to dance?
- 17 What tree scorns death?
- 18 What tree would be likely to bark?
- 19 What tree is the abode of angels?
- 20 What tree is the most tearful tree?

KEY

- | | | |
|------------------|------------------|-------------------|
| 1 Bay | 9 Beech | 16 Hop tree |
| 2 Evergreen | 10 Bottle tree | 17 Live oak |
| 3 Spruce | 11 Hickory | 18 Dogwood |
| 4 Pine | 12 Plane tree | 19 Paradise tree |
| 5 Palm | 13 Fir | 20 Weeping willow |
| 6 Horse Chestnut | 14 Pawpaw | |
| 7 Yew | 15 Umbrella tree | |
| 8 Elder | | |

Adventures of Daffy Dilly. The blanks in this exercise are to be filled in with names of plants. The hostess should have the answers written on small cards, and give to each guest a set. The test is to make the right selections. The answers, if not arranged in regular order, may be placed where all can see them, if the hostess prefers.

- 1 Who was Daffy Dilly? He was the son of
...1.. and...2..
- 2 Where did he go? He went on a journey
to seek a good 3.
- 3 What did he say as he started out? Fare-
well my ...4... 5.
- 4 What did he wear? 6, fastened with
...7...
- 5 What were on his feet? Pink 8
- 6 What did he carry for a staff? A 9.
- 7 What kind of a hat did he wear? A 10.
- 8 What emblem was waving in it? The
American ...11...
- 9 What money did he carry? A 12
- 10 In what did he keep it? In a 13
- 11 What did he use to count it with? An
...14...
- 12 What sweets did he take for his lunch?
... 15 and 16 ...
- 13 What did he use for a guide? A 17.
- 14 How did he start off? With a 18
- 15 What was his parents' parting admoni-
tion? Don't. 19 ..
- 16 What was the first strange thing he saw?
A cow with a . 20 .
- 17 What did Dilly say? 21
- 18 What next did he see? He saw the 22 .
and break a bone
- 19 What did he say then? Can you ...23.. it?
- 20 Did he offer any assistance? Yes, he
asked the cow if she would like to have
her . 24.
- 21 What did the cow do? She shed . 25
and became very angry
- 22 Did Dilly laugh again? Yes and that made
the cow still 26
- 23 What did the cow say then? She said,
"Don't be ...27 at me I don't like
your ...28 .."
- 24 What did Dilly say? He said, "You can't
...29.. me"
- 25 What happened next? He saw a . 30 .
coming down the path
- 26 What did he say then? " 31.. part
friends, oh cow, as I must be going"
- 27 What happened next? He went away in
a ...32.. ing hurry
- 28 What did he do then? He went straight
home to his . 33...
- 29 What did his father say when Dilly told
his adventures? He said, "Don't 34
that There is ...35.. as you for sowing
...36 .. Hereafter you will tend my
... 37 .. of sheep
- 30 What did Dilly say? He said, "All right
...38..."

KEY

- | | | |
|---------------|---------------|----------------|
| 1 Artichoke | 12 Pennyroyal | 24 Bonaset |
| 2 Daisy flea- | 13 Shepherd's | 25 Job's tears |
| bane | 14 purse | 26 Madder |
| 3 Thyme | 14 Adder's | 27 Pecan |
| 4 Sage | 15 tongue | 28 Capers |
| 5 Elders | 15 Pieplant | 29 Nettle |
| 6 Dutchman's | 16 Candytuft | 30 Dandelion |
| breeches | 17 Compass | 31 Lettuce |
| 7 Bachelor's | 18 plant | 32 Tare |
| buttons | 18 Hop | 33 Poppy |
| 8 Moccasins | 19 Dodder | 34 Lilac |
| 9. Goldenrod | 20 Goosefoot | 35 Nonesuch |
| 10 A bishop's | 21 Haw haw | 36 Wild Oats |
| cap | 22 Cowslip | 37 Phlox |
| 11 Flag | 23 Beet | 38. Pawpaw |

For children's sports, see GAMES.

ENTOMOL'OGY, that branch of zoölogy which treats of insects. See INSECTS.

ENVELOPE, the paper cover enclosing a letter. Envelopes are so commonplace it seems strange that they have not been used for hundreds of years; but before 1840 they were unknown. Previous to that date a letter was folded so that a blank side served as a place for the address, and it was sealed with sealing wax.

Envelopes are made on specially-constructed machinery, and one modern machine will cut, fold, paste, print and box about 60,000 in a day. The usual sizes are known by numbers, as follows:

No 4,	4½×4½ inches	No 7,	3½×7½ inches
" 5,	3½×5½ "	" 9,	4½×9½ "
" 6,	3½×6½ "	" 10,	4½×9½ "
" 6½,	3½×6½ "		

ENVIRONMENT, a general term used to indicate all the external conditions which affect the life and activity of an individual. It thus includes everything outside of self and is oftentimes used in distinction to the term *heredity*, or the influence which descends from parent to offspring. The environment of an individual is of two kinds, physical and social. The first includes the natural conditions of climate; topography; physical laws, such as gravity and those which produce light, darkness and sound, and the nature and extent of food supply. In the early stages of racial development physical environment is nearly all-important, and in view of this fact a certain group of scholars have emphasized the influence of natural economic conditions upon history, to the extent of declaring that this force is the most important of all influences upon the development of a race or nation. In advanced stages of civilization the social environment attains greater importance. By the use of the materials and conditions that nature throws about every race, customs, ideals and institutions are gradually developed, which soon become a determining influence in the life of the individuals that make up the races. Such are the institutions of family and state, customs and ideals of religion and industry. See HEREDITY.

ENVOY EXTRAORDINARY, a person dispatched from one country to another upon a special political or complimentary mission of unusual importance. An envoy extraordinary is sent by a ruler to represent the ruler and the state at the coronation

or the funeral of another ruler; he is entrusted with a special diplomatic mission of delicate importance, for the time ranking the regular diplomatic representative from his country. His function ceases when he has discharged the single duty for which he was appointed.

Envoy Extraordinary and Minister Plenipotentiary, the grade of diplomatic representative next below that of ambassador (which see). Until 1896 the United States sent no representative abroad of higher rank, but in that year Germany, Great Britain, France and Italy each raised the rank of its diplomatic representative in America to that of ambassador, and the United States returned the compliment in kind. The envoy extraordinary and minister plenipotentiary represents his *country*, while the ambassador is the personal representative, as well, of the *ruler* of his country, a slightly more exalted station. The United States accredits about thirty diplomats of this second highest rank to foreign countries, and a like number are accredited to the United States. The salary paid by America ranges from \$4,000 to \$12,000 per year, out of which the envoy must pay all his expenses. The rank next lower is that of minister resident. See DIPLOMACY, AMBASSADOR.

EOCENE, *e'o seen*, PERIOD, a division of geologic time in the first part of the Cenozoic Era. In the United States the rocks formed during this period extend along the Atlantic coast and the Gulf of Mexico, up the Mississippi Valley to a point north of the Ohio. They also occur in some of the ranges of the Rocky Mountains. The rocks include marls, clays, sandstone and limestone. Nearly all the mammals existing to-day had become clearly defined by the end of this period. See GEOLOGY.

EPAMINONDAS, *e pam i non'das* (418?-362 B. C.), a Greek general and statesman. As a native of Thebes he feared the growing maritime power of the confederacy of Athens and equipped a fleet with which he captured several Athenian seaport towns. Four times as commander in chief of the Theban army he successfully invaded the Peloponnesus, or southern peninsula of Greece, when Thebes was threatened. His principal achievement was the overthrow of Sparta's power in the Peloponnesus and the establishment of Theban supremacy in Greece.

EPHESIANS, *e f'e shanz*, EPISTLE TO THE, a letter addressed to the Christians at Ephesus by the Apostle Paul. It is supposed that it was written about the same time as the Epistles to the Colossians and Philemon, while Paul was imprisoned in Rome (see *Acts XXVIII*). The theme of the letter to the Ephesians is the ideal unity of the Church in Christ. It contains six chapters, the last of which contains the famous passage describing the armor of a Christian—the breastplate of righteousness, the shield of faith, the helmet of salvation, etc.

EPHESUS, *ef'e sus*, an ancient Greek city of Lydia, in Asia Minor, situated on the southern bank of the Cayster, near its mouth. Its fine harbor made it at one time the emporium of Western Asia. During the time of the Roman emperors it was especially prosperous. Several church councils were held here. Some interesting ruins have recently been excavated, including that of the great Temple of Diana, and many statues and reliefs. The site of the city is now a desolate waste.

EPHRAIM, *ef'ra im*, the younger son of Joseph and the founder of one of the Twelve Tribes of Israel. This tribe was the most warlike in Israel. To it belonged Joshua and Samuel.

EPIIC, a narrative poem. Some authorities restrict the term to narrative poems written in a lofty style and describing the exploits of heroes. Others widen the definition so as to include not only long narrative poems of romantic or supernatural adventure, but also those of a historical, legendary, mock-heroic or humorous character. The epic is distinguished from the drama by the fact that in the epic the author frequently speaks in his own person as narrator; and it is distinguished from lyrical poetry by its preponderance of action over emotion. Among the more famous epics of the world's literature are Homer's *Iliad* and *Odyssey*, Vergil's *Aeneid*, the German *Story of the Nibelungs*, the Anglo-Saxon poem of *Beowulf*, the French *Song of Roland*, Dante's *Divine Comedy* and Tasso's *Jerusalem Delivered*.

EPIOTETUS (60-94), a Greek Stoic philosopher, born in Phrygia. He lived long at Rome, where in his youth he was a slave. Though nominally a Stoic, he was not interested in Stoicism as an intellectual sys-

tem; he adopted its terminology and its moral doctrines, but in his discourses he appeared rather as a moral and religious teacher than a philosopher. See STORISM.

EPICURUS, *ep i ku'rus* (342-270 B. C.), a Greek philosopher, founder of the Epicurean School, was born on the island of Samos. He settled at Athens in 307 B. C. and there, in a garden which he had bought for the purpose, established a school of philosophy. "Philosophers of the garden," his followers were called. Few of his writings survive. His indirect influence was great—the influence he exerted through other ancient writers. Plutarch, Cicero and Lucretius are the chief sources of our information concerning him.

Epicureanism, a system of philosophy founded by Epicurus. It was based on the principle that pleasure is the chief good. Those desires which can be fulfilled with the least effort or pain were thought to bring the most pleasure; and desire for enjoyment, except such cravings as do not lead to a calm mental state, was to be satisfied. The creed is not so simple nor is it as easily followed as at first appears; for the true Epicurean indulged in no pleasure which might lead to repentance. Epicurus and his friends led lives of temperance and simplicity. They valued knowledge only as it increased personal enjoyment. They believed that the soul and body died together; consequently they had no fear of death, since while the individual was alive, death was absent, and when death came, the individual was no more. They were bound by allegiance to no particular state or society, but believed in the absolute independence of the individual. The doctrines of Epicureanism were spread throughout Greece and were accepted by many of the prominent Romans. In modern usage the term *Epicurean* is applied to one who seeks pleasure for its own sake.

EPIDEMIC, *ep i dem'ik*, the general prevalence of a disease in a community. Most epidemics are due to the presence of disease germs. Malaria, typhoid, influenza, diphtheria, cholera, smallpox and bubonic plague are among the germ diseases which attack whole communities, each caused by a different germ. Most of them are carried about in the air, in drinking water or by insects. Malaria, which is caused by an animal parasite in the blood, is transmitted by the mosquito which sucks the blood of the ma-

larial patient and, carrying the disease germs on its proboscis, inoculates the next person it attacks. Thanks to medical and sanitary science, many communities once the prey of malaria epidemics have been rendered comparatively safe through the drainage of swamps and ponds and the destruction of other breeding places of the insect. Numerous epidemics of typhoid have been known to start with a polluted water supply. These have been checked by impressing upon the affected community the importance of boiling or filtering the drinking water.

In the cases of both malaria and typhoid the disease, which is due to local causes, is usually confined to a more or less restricted locality. A disease transmitted through the air we breathe, however, may have a vast range, for while the disease is in the early stages the patient may travel about and infect large numbers. The influenza epidemic which attacked the United States in the fall of 1918 was country-wide and was checked only after the most strenuous concerted effort and governmental regulations. Large indoor public gatherings were prohibited; dentists and barbers wore antiseptic masks at their work, and street-car companies were forced to ventilate their cars thoroughly.

Some germ diseases are contagious, that is, are transmitted from one person to another by actual physical contact, or may even be conveyed on clothing or in merchandise from one country to another. Smallpox is one of these, and terrible epidemics of it can be prevented only by general vaccination. In dealing with germ diseases an ounce of prevention is worth a pound of cure, whether the preventive measure consists in rendering people immune or in making their environment harmless. Bacteriology, though a comparatively new science, has done much to help man conquer these minute but powerful enemies—enough to inspire the hope that they may one day be altogether exterminated.

Related Articles. Accompanying the article *Disease* is a list of the human ailments treated in these volumes. For other information consult the following titles:

Bacteria and
Bacteriology
Germ Theory of
Disease

Medicine
Sanitary Science
Serum Therapy
Toxins

EPIDERMIS. See SKIN.

EPIGRAM, according to the modern meaning of the word, a short poem which, preferably at the end, gives a witty or in-

genious turn to the thought The name is also applied to any concise expression of a general fact. Among the Romans, Catullus and Martial were famous for their epigrams In English literature, during the Age of Elizabeth, almost every writer of note wrote epigrams, and in a later period Pope especially excelled in this style of writing.

EPILEPSY, *ep'ilep'si*, or **FALLING SICKNESS**, a disease of the nervous system, causing unconsciousness, either with or without convulsions While epilepsy has been known for centuries, it is only within recent years that it has been scientifically studied. The location of the disease is generally considered to be in the gray matter of the brain.

There are many varieties of the disease, in some of which there are few outward signs of the attack, and the patient may not know that he has been unconscious. In one type of the disease the seizures always occur during sleep. In the ordinary epileptic fit, the person, after little or no warning, becomes suddenly unconscious and falls, foaming at the mouth He may have violent convulsions, in which case he should be prevented from doing himself harm in any way. The seizures are often very alarming in appearance, but there is little or no danger, and they will pass away in from ten to twenty minutes, leaving the patient weak for some time Nothing need be done except to loosen the neckbands and clothing about the chest, to lay the person down and slightly raise his head Attempts to force consciousness to return are useless and may be injurious.

Few epileptics can be cured, but special attention to general health tends to decrease the number of attacks Serious cases are best taken care of in colonies for epileptics While the disease sometimes causes a gradual impairment of the mental powers, there are many epileptics who live long and useful lives

EPIPHANY, *epi'fani*, a religious observance of the Roman Catholic, Anglican and Eastern churches. Formerly it commemorated the birth and baptism of Christ, but since 813 Epiphany has been observed in honor of the manifestation of the Infant Jesus to the *Magi*, who, guided by a star, went to Bethlehem to worship him. The date of Epiphany is January 6.

EPIPHYTES, *ep'i'fites* See AIR PLANTS.

EPIRUS, *e pi'rus*, an administrative division in the extreme northwestern part of Greece. The district has always played a passive part in history. It was occupied by independent tribes until the third century B. C., when King Pyrrhus unified it and gave it a temporary importance In 168 B. C. it was conquered and annexed by the Romans; in the fourteenth and fifteenth centuries it passed back and forth between the Albanians and the Turks, and finally, in March, 1916, Greece took formal possession of it Its ultimate fate was decided by the Peace Conference in 1919 Population about 313,000 (See WORLD WAR)

EPISCOPAL, *e pis' lo pal*, **CHURCH** or **PROTESTANT EPISCOPAL CHURCH**, in the United States of America, a branch of the Church of England, maintaining the faith, sacraments, rites and ceremonies of the mother church The first prayer book services in America were held in 1570 near the site of San Francisco; the first services on the Atlantic Coast were conducted at Jamestown, June, 1607 The constitution was adopted in 1789 and the first bishop was consecrated in 1784 The communicants number over 1,300,000 The church is governed by the general convention which meets every three years It is composed of the House of Bishops and the House of Clerical and Lay Deputies, four clergymen and four laymen from each diocese serving as deputies Changes in the prayer book or constitution of the church can be made only by the General Convention; each proposed change must be published in every diocese for three years preceding final action Within the ranks of the church and organized for Christian service are six religious orders for men and fifteen orders for women.

EPITAPH, *ep'i'taf*, an inscription in honor of the dead, placed on a tomb, monument or other memorial. The term is also applied to literary tributes to the dead not intended to be inscribed on burial stones. The writing of epitaphs was practiced in ancient times by the Egyptians, Greeks and Romans, and several have come down from antiquity. Perhaps the most famous of these is the tribute of Simonides to the heroic band who died at Thermopylae:

Go tell the Spartans, thou that passest by,
That here, obedient to their laws, we lie.

The collection of epitaphs of historic, literary or sentimental interest has resulted

in the publication of a number of books on the subject. At the present time the epitaph usually seen on a gravestone consists of the name of the dead, the dates of birth and death, and a line or two of eulogy, or, perhaps, an extract from the Bible. In old-fashioned cemeteries, however, especially in English and colonial burial grounds, one finds many extraordinary memorials to the departed. One collector of epitaphs vouches for the following inscriptions on tombstones in English churchyards:

Some have children—some have none—
Here lies the mother of twenty-one

Under this stone lieth the Broken Remains of Stephen Jones who had his leg cut off without the Consent of Wife or friends on the 23rd October, 1842, in which day he died Aged 31 years.

An epitaph of genuine literary merit is Stevenson's *Requiem*, beginning "Under the wide and starry sky." It is engraved on his tomb on Mount Vasa, in the Samoan Islands.

E PLURIBUS UNUM, a Latin phrase meaning *out of many, one*, the national motto of the United States. It was suggested by Adams, Jefferson and Franklin, the committee appointed by Congress on July 4, 1776, to design a national seal. It has never been officially adopted, though it has been used continuously on coins.

EPOCH, *ep'ok*, an interval of time in the world's history marked by some extraordinary occurrence and for that reason distinguished from the rest of history and regarded as a milestone in the onward course of events. Such were the Age of Pericles, the Middle Ages and the Renaissance. Some epochs, based on astronomical time divisions, are used for convenience in a conventional division of history; thus, the eighteenth century, the nineteenth, the latter half of the nineteenth century, are distinct epochs.

EPSOM SALTS, a variety of salts widely used as a laxative, in the manufacture of sulphates of sodium and potassium, as a fertilizer and as a coating for cotton cloth. It is composed of crystals of sulphate of magnesium, and is found native in some mineral springs, but is usually manufactured from magnesian limestone. It takes its name from Epsom, England, where it was first procured from mineral waters. It is found native in the limestone caves of Indiana, Kentucky and Tennessee.

EP'WORTH LEAGUE, a religious society of the young people of the Methodist Epis-

copal Church, organized in 1889. In most churches there is a junior auxiliary, which holds services for the children on Sunday afternoons. An intermediate grade is sometimes included. The work of the League is divided into five branches—spiritual, missionary, mercy and help, literary and recreation, and civic betterment. Each of these departments is in charge of a vice-president. The other officers are the president, secretary, and treasurer. The League has a total membership of about 615,000, with branches in all countries where the Methodist Episcopal Church is established. The *Epworth Herald*, the League's official organ, is published in Chicago. Epworth is the town in England where John Wesley, founder of Methodism, was born.

EQUATOR, *ekwa'tor*, the great imaginary line circling the earth and dividing it into two equal parts called the northern and southern hemispheres. This circle is at all points 90° from the poles. Degrees of latitude are measured from the equator north or south along imaginary lines perpendicular to it and extending to the poles. All places on the equator have invariably equal days and nights. The *celestial equator* is an imaginary circle in space the plane of which is perpendicular to the axis of the earth. When the sun crosses the celestial equator, in spring and in autumn, the days and nights are of equal length. An irregular line encircling the globe and passing through points north and south of the equator is known as the *magnetic equator*. See **DIPPING NEEDLE**.

EQUINOCTIAL, *ekwino'ktshal*, in astronomy, the circle in the heavens otherwise known as the celestial equator. When the sun is on the equator, there is equal length of day and night over all the earth; hence the name *equinoctial*. *Equinoctial gales* are storms which seem to be due to the sun's crossing the equator, occurring at the vernal and autumnal equinoxes, in March and September. There is no scientific basis for the belief that the sun's position causes these storms, although this belief is held by many people. *Equinoctial points* are the two points where the celestial equator and ecliptic intersect each other; the one, being in the first point of Aries, is called the *vernal point*; and the other, in the first point of Libra, the *autumnal point*. See **PRECESSION OF THE EQUINOXES**.

